Gurney

HEATING ENGINEERS COMPANION

CATALOGUE B&R-213

HEATING ENGINEERS' COMPANION

CATALOGUE
B. & R. 213
CANCELLING ALL
PREVIOUS LISTS

Edition Corrected to May 1st, 1921

THE
GURNEY FOUNDRY CO., LIMITED
TORONTO
AND LEADING CENTRES

Gurney

TO THE HEATING ENGINEERS, ARCHITECTS AND CONTRACTORS IN CANADA

WE offer you in this book the most complete line of heating supplies in Canada and the only complete line of Made-in-Canada boilers. Back of this line is real service.

We hold ourselves responsible to the extent of furnishing castings or parts to replace any such found defective through causes in manufacture, but under no consideration for loss of labor or damage. This responsibility or guarantee expires one year from date of invoice.

All undertakings are subject to strikes, fires, or other circumstances beyond our control.

All shipments are made in good order and should be examined before accepting from Transportation Companies, and should there be any breakage it must be marked on the freight receipt and value collected from them.

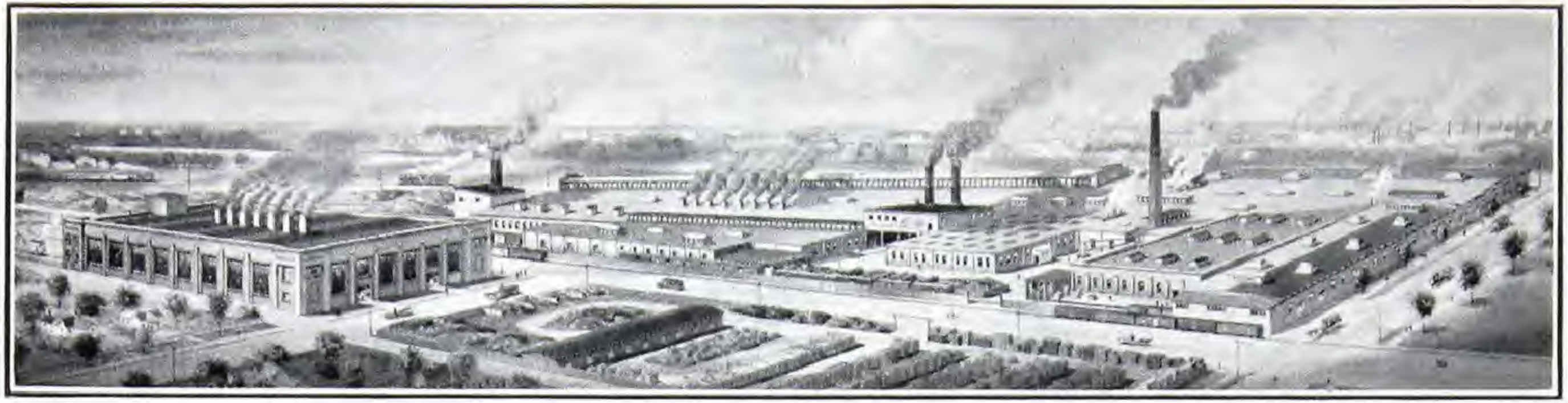
We cannot guarantee safe delivery to destination.

Return no goods without our permission. Goods returned will be subject to a discount for handling charge.

*Ratings of all boilers and radiators are shown in empirical feet, a unit to denote the relative heating power of boilers and the cooling power of radiators.

When selecting size of boiler required make due allowance for mains and riser. Direct-indirect radiation requires 40% more boiler capacity, and indirect 75%. When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

The Gurney Foundry Company, Limited - Toronto
The Gurney-Massey Company, Limited - Montreal
The Gurney North-West Foundry Co., Limited Winnipeg
The Gurney Foundry Company, Limited - Vancouver



GURNEY BOILER AND RADIATOR PLANT
WEST TORONTO

Exclusively for the manufacture of GURNEY Boilers and Radiators.

Gurney

THE GURNEY ECONOMIZER

THE GREAT FUEL SAVER

Shipped with every

GURNEY ROUND HOT WATER BOILER

The **Gurney** "Economizer" is shipped without extra charge with all **Gurney** Round Hot Water Boilers. It so increases the efficiency of the Boiler that we prefer to insure it being on every **Gurney** Boiler rather than to sell it as a specialty.

Licensed for use with the GURNEY Heating and Cooking Apparatus only

THE GURNEY ECONOMIZER

THE Gurney "Economizer" smoke outlet in the top section of the Gurney Round Hot Water Boiler is a housing of cast iron which connects the top of the boiler with the smoke flue. In the back of this housing, as will be seen, there is an opening that may be completely closed by a snug-fitting damper when the handle on the side of this housing is raised. The lowering of this handle causes the one damper flap to gradually increase the opening at the back of the housing into the smoke stack, while it decreases the smoke opening of the boiler.

This means that the boiler may be checked off without drawing cold air over the already heated sections, which prevents this most wasteful practice. It also means that the boiler may be checked down finer than under any other known system of control, because, even supposing that this check is carried to the point that furnace gas in not burned, this gas is at once carried up the chimney and does not escape into the house.

Licensed for use with GURNEY
Apparatus only

Gurney

GURNEY "G" SERIES
ROUND HOT WATER BOILER

(Illustrating No. 4-G.)

Gurney

"G" SERIES
GURNEY HOT WATER BOILERS

Ratings, Weight, Etc.

No. of Boiler	*Net Rating, Radiation, Feet	*Gross Rating Radiation, Feet	Nominal Dia. Grate, Inches	Diameter of Smoke Collar, Inches	No. of Flow and Return Openings	Approximate Shipping Weights
1-G	235	575	17¼	7	2–2in.	910
2-G	335	800	20¼	7	4–2in.	1200
3-G	500	900	22	8	4–2in.	1375
4-G	670	1100	25	8	4–2in.	1630
5-G	835	1350	27	10	6–2in.	1950
6-G	1000	1600	29	10	6–2in.	2400

All mains should be securely covered with good non-conducting material.

Make due allowance for mains and risers when selecting size of boiler required.

Detail measurements on pages 12 and 13.

Chimneys of adequate size are necessary to good results. See table, pages 120 and 121.

*See page 2.

Gurney

"G" SERIES
THE GURNEY ROUND HOT WATER BOILER

This illustration shows the fire pot, with the first section raised from its normal position and placed on edge above it. This shows the large single nipple by which the sections are connected, the sloping walls of the fire pot and also the bell-mounted openings in the first section.

Cross section of fire pot, and view of first section over the fire.

Gurney

TWIN, TRIPLE AND QUADRUPLE CONNECTIONS
For
ROUND HOT WATER BOILERS

Size of Boiler	**TWIN** Run of Header, Inches	**TRIPLE** Run of Header, Inches	**QUADRUPLE** Run of Header, Inches	Sizes of Valves, Inches
No. 2-G to No. 4-G	4	5	6	4
No. 5-G and No. 6-G	5	6	8	5
No. 6½-C	6	8	8	5
No. 7-B	6	8	9	5
No. 8-C	8	8	10	6
No. 9-D	8	9	10	6
No. 10-C	8	9	10	6

No allowance made for ordinary headers.
Furnished with or without valves as ordered.

CAST IRON DOMESTIC WATER HEATERS
For
ROUND HOT WATER BOILERS

Small size for No. 1-G to 3-G.
Medium size for No. 4-G to 6½-C.
Large size for No. 7-B to 10-C.

These heaters rest on top edge of firepot, under first section, and can be used with any of our B, C, D, E, F or G Series.

All these boilers have two holes in rim of firepot with removable plugs through which connection can be made with the Domestic Water Heaters. These Domestic Heater openings are on both sides of the boilers.

Special Copper Heaters made to order for any size boiler.

Gurney

OXFORD
ROUND HOT WATER BOILER

(Illustrating No. 9-D.)

Gurney

OXFORD HOT WATER BOILERS

Ratings, Weights, Etc.

No. of Boiler	*Net Rating Radiation, Feet	*Gross Rating Radiation, Feet	Diameter of Grate, Inches	Diameter of Smoke Collar, Inches	No. of Flow and Return Outlets	Approximate Shipping Weight, Low Base
6½-C	1250	2000	32¼	10	6-2	3300
7-B	1500	2400	35¼	11	8-2	3400
8-C	2000	3200	37	11	8-2	4700
9-D	2667	4000	38½	11	12-2	5300
10-C	4000	5500	42	12	12-2	5700

All mains should be securely covered with good non-conducting material.

Make due allowance for mains and risers when selecting size of boiler required.

Detail measurements on pages 14 and 15.

Chimneys of adequate size are necessary to good results. See tables, pages 120 and 121.

Where a low cellar height makes the saving of every inch desirable, we can supply a special top section with back outlet to take flow header.

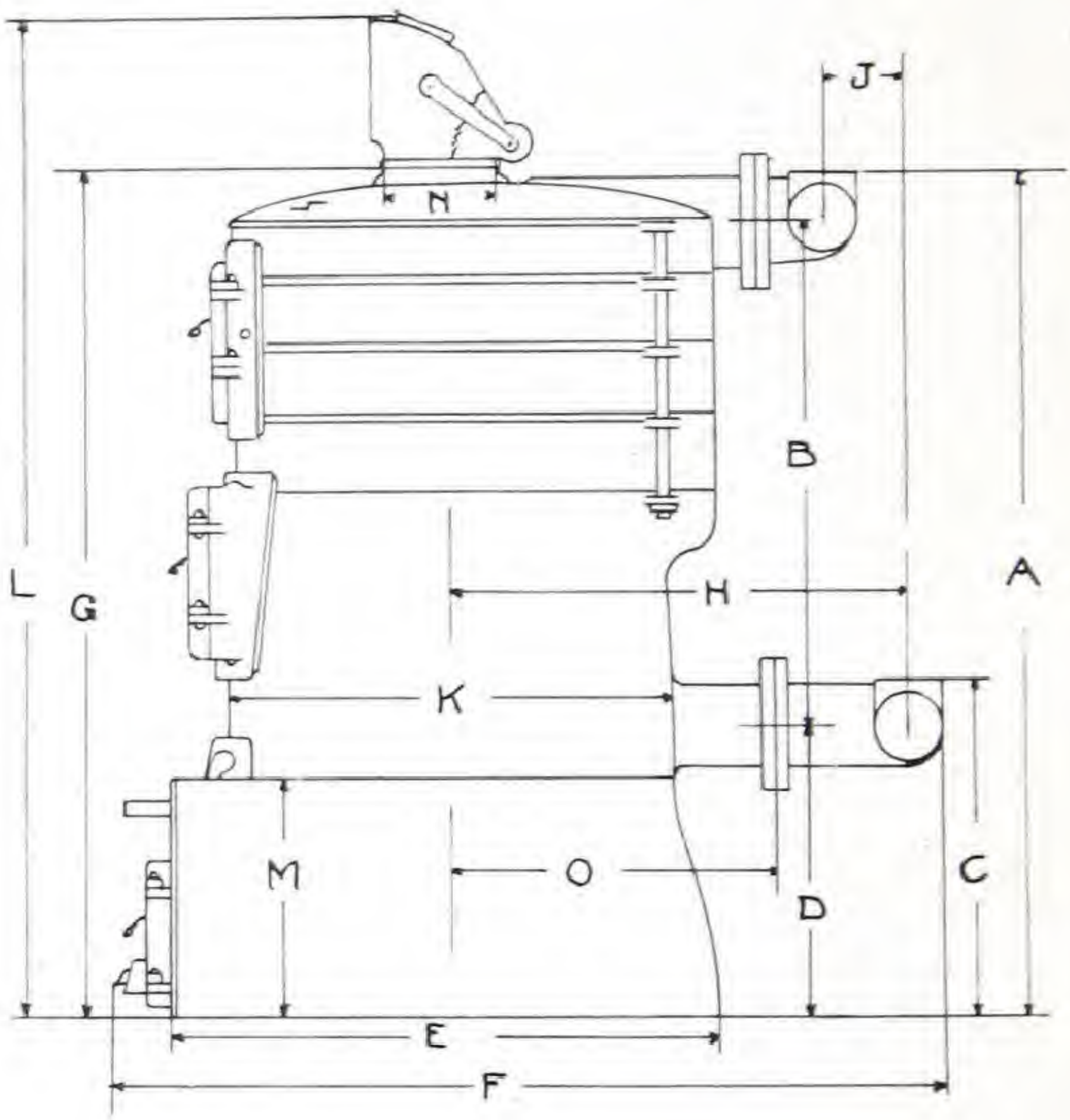
This effects a saving in height of No. 6½-C. 11", No. 7-B. 10", No. 8-C. 9½", No. 9-D. and No. 10-C. on application.

*See page 2.

Gurney

"G" SERIES
GURNEY ROUND HOT WATER BOILER.

Dimensions



For details consult table on page 13.

"G" SERIES GURNEY ROUND HOT WATER BOILERS.

Dimensions

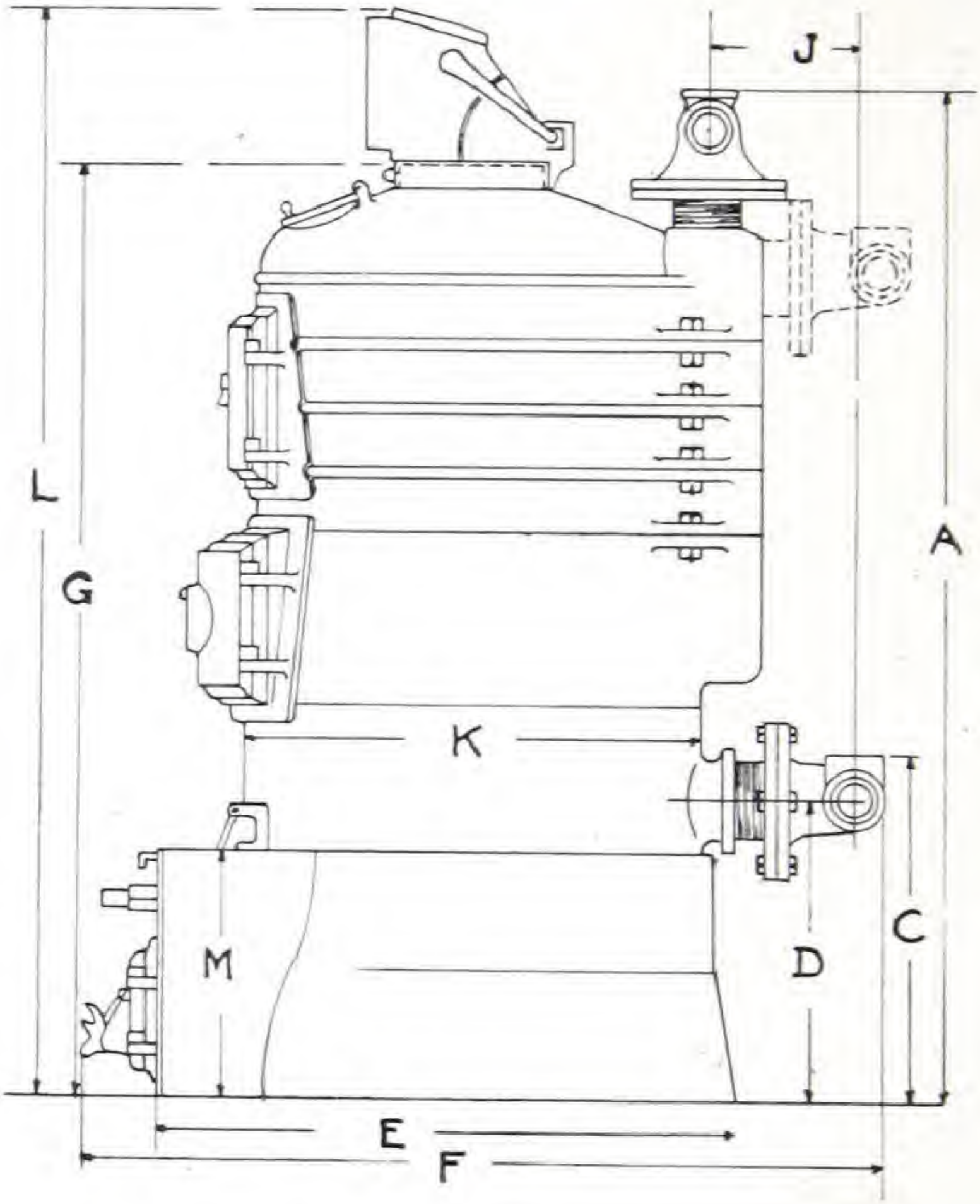
Dimen.	A	B	C	D	E	F	G	H	J	K	L	M	N	O	
No. of Boiler	Height to top of Header, Inches	Centre to Centre of Flanged Openings (Vertical)	Floor to top of Return Header	Floor to Centre of Return, Inches	Length of Base, Inches	Length Overall, Inches	Height to Top of Smoke Collar, Inches	Centre of Boiler to Centre of Return	Dist. between Flow and Return Headers Horizontal	Outside Diameter of Fire-Pot, Inches	Height to top of Economizer, Inches	Height of Base, Inches	Size of Smoke Collar	Centre of Boiler to Face of Return Flange	Size of Valves for Twinning
1-G	45½	28	17¼	15½	26¼	39½	46	19½	.....	20½	54½	13	7	15¼	3
2-G	48½	29½	19	16½	30	47	48½	25¼	4½	24½	57¼	13	7	16¾	4
3-G	49½	29½	20½	17½	32	49¾	51	27	5	26	60	14½	7¾	18½	4
4-G	53	31	21¾	18¾	35	53¼	53½	29½	5	29	62½	15½	7¾	21	4
5-G	56	32¼	24½	20¾	37¼	58	57½	31¾	5½	31	67	17½	10	22¼	5
6-G	56	32¼	24½	20¾	40	60	57½	32	5¼	33	67	17½	10	20	5

Gurney

Gurney

"B" SERIES
OXFORD HOT WATER BOILER

Standard Dimensions



For details consult tables on page 15.

See page 15 regarding special back-outlet top section.

STANDARD DIMENSIONS OXFORD "B" SERIES ROUND HOT WATER BOILERS.

Dimension	A	C	D	E	F	G	J	K	L	M	
No. of Boiler	Total Height to top of Headers, inches	Floor to top of Return, inches	Floor to Centre of Return, inches	Length of Base, inches	Length Over-all, inches	Height to top of Smoke Collar, ins.	Centre to Centre of Headers, inches	Outside Diameter of Firepot, inches	Height to top of Economizer, inches	Height of Base, inches	Size of Screw Nipple Connection, Boiler and Headers
6½-C	73¼	24½	20⅞	42¾	60	65¾	15	38½	76	17½	5
7-B	71½	24½	20⅞	46½	62	65	11¼	41	76	17½	5
8-C	75¼	25	21⅜	48½	66	67	14	42¼	77½	17½	5
9-D	75½	25	20⅞	48½	69½	65½	13	43¾	75¾	18	6
10-C	78	25¼	21	52	73	68½	14¾	51	79½	18	6

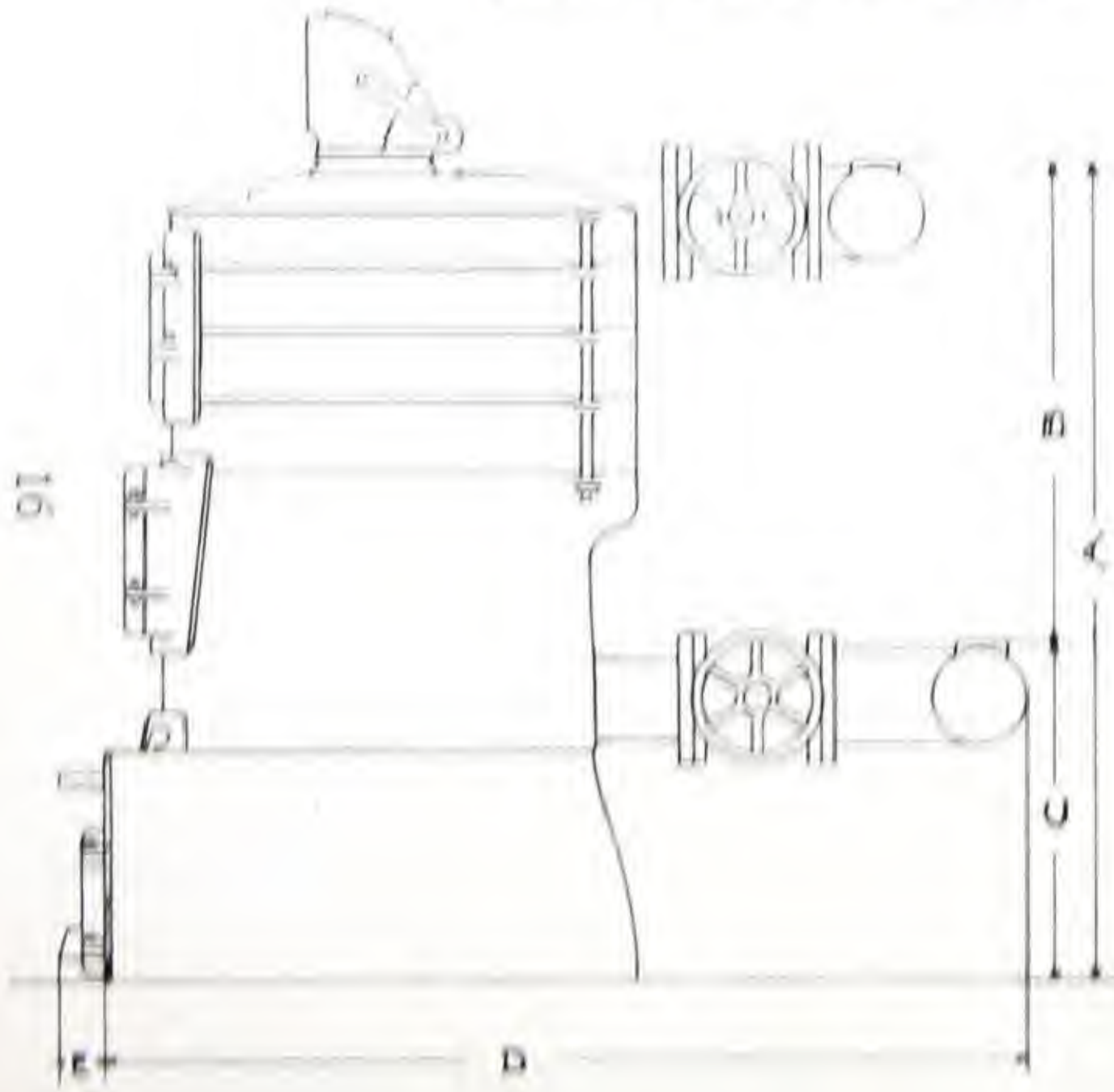
Where a low cellar height makes the saving of every inch desirable, we can supply a special top section with back outlet to take flow header.

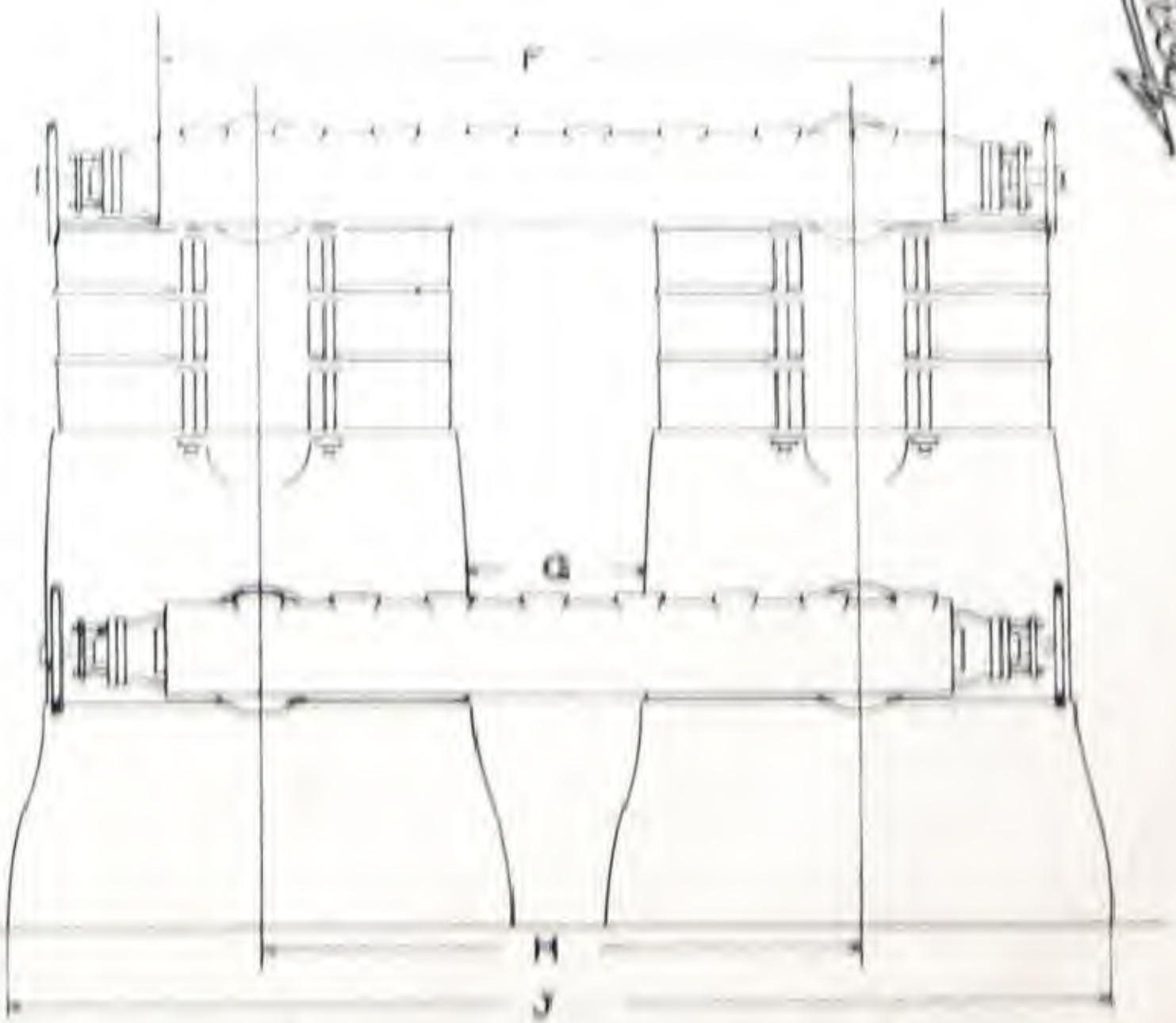
This effects a saving in height of No. 6½-C 11 in., No. 7-B 10 in., No. 8-C 9½in., No. 9-D and No. 10-C on application.

Gurney

"G" SERIES GURNEY ROUND HOT WATER BOILERS

With Twin Connections. **Standard Dimensions.**





TWIN CONNECTIONS FOR "G" SERIES GURNEY HOT WATER BOILERS

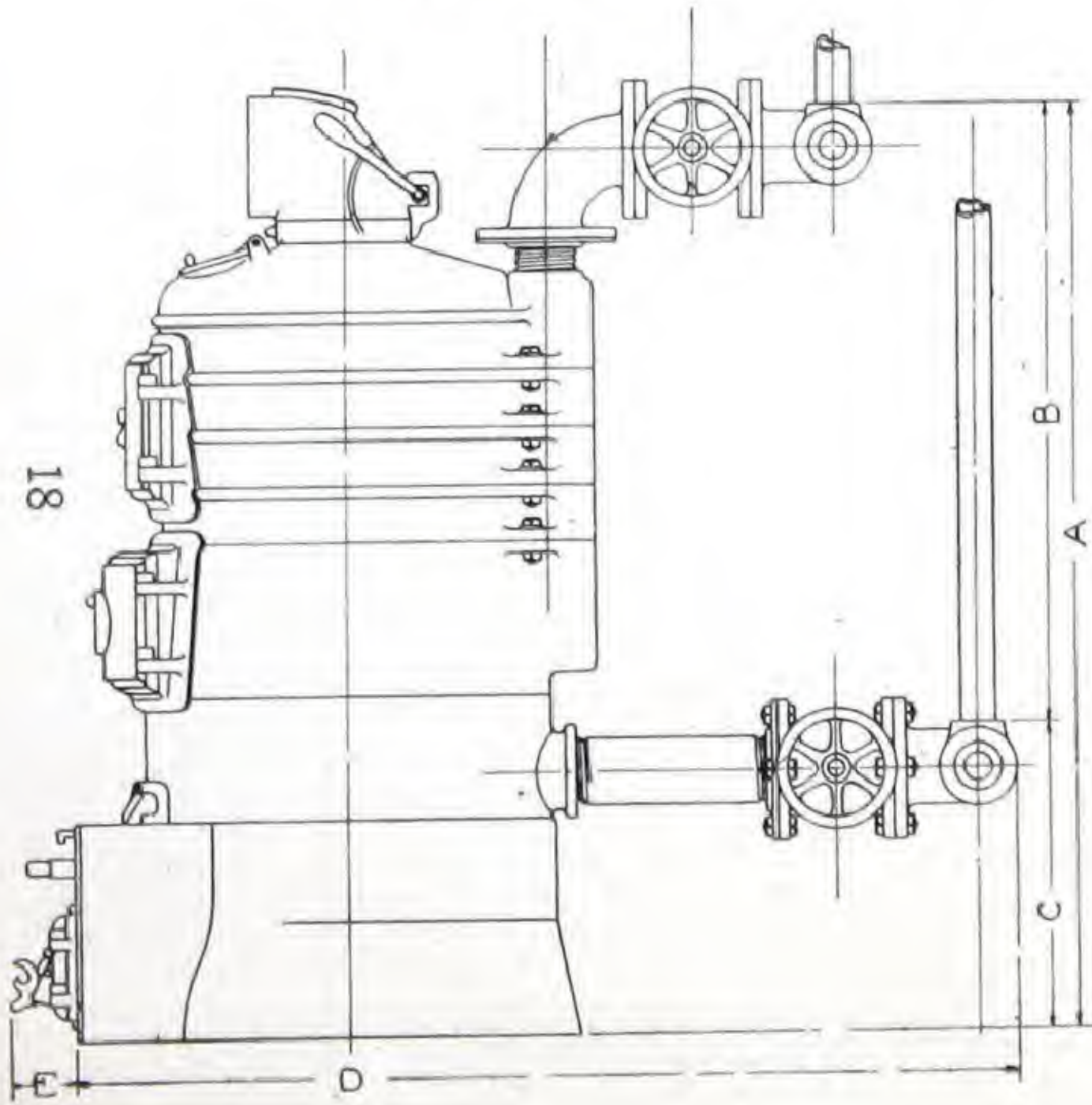
Standard Dimensions

No. of Boiler	A Total Height to top of Header, inches	B Top of Return to top of Flow Header, inches	C Floor to top of Return, inches	D From Front of Base to Clear of Return, inches	E E-D Over-all Dimension, inches	F Length of Flow and Return Header, inches	G Distance between Firepot, inches	H Centre to Centre of Boilers, inches	J Width of Boilers over Bases, inches	Size of Valves	No. of Tappings	Size of Standard Tappings	Width of Valves Face to Face
2-G	$50\frac{1}{4}$	$29\frac{1}{2}$	$20\frac{3}{4}$	$54\frac{1}{4}$	$4\frac{3}{4}$	55	$11\frac{1}{4}$	$35\frac{3}{4}$	$65\frac{1}{4}$	4	8	2	$7\frac{1}{2}$
3-G	$51\frac{1}{4}$	$29\frac{1}{2}$	$21\frac{3}{4}$	$55\frac{3}{4}$	$4\frac{3}{4}$	55	16	42	$73\frac{1}{2}$	4	8	2	$7\frac{1}{2}$
4-G	54	31	23	$59\frac{1}{2}$	$4\frac{3}{4}$	55	13	42	76	4	8	2	$7\frac{1}{2}$
5-G	$57\frac{3}{4}$	$32\frac{1}{4}$	$25\frac{1}{2}$	66	$4\frac{3}{4}$	72	16	47	84	5	10	2	$8\frac{3}{4}$
6-G	$57\frac{3}{4}$	$32\frac{1}{4}$	$25\frac{1}{2}$	66	$4\frac{3}{4}$	86	14	47	86	5	12	2	$8\frac{3}{4}$

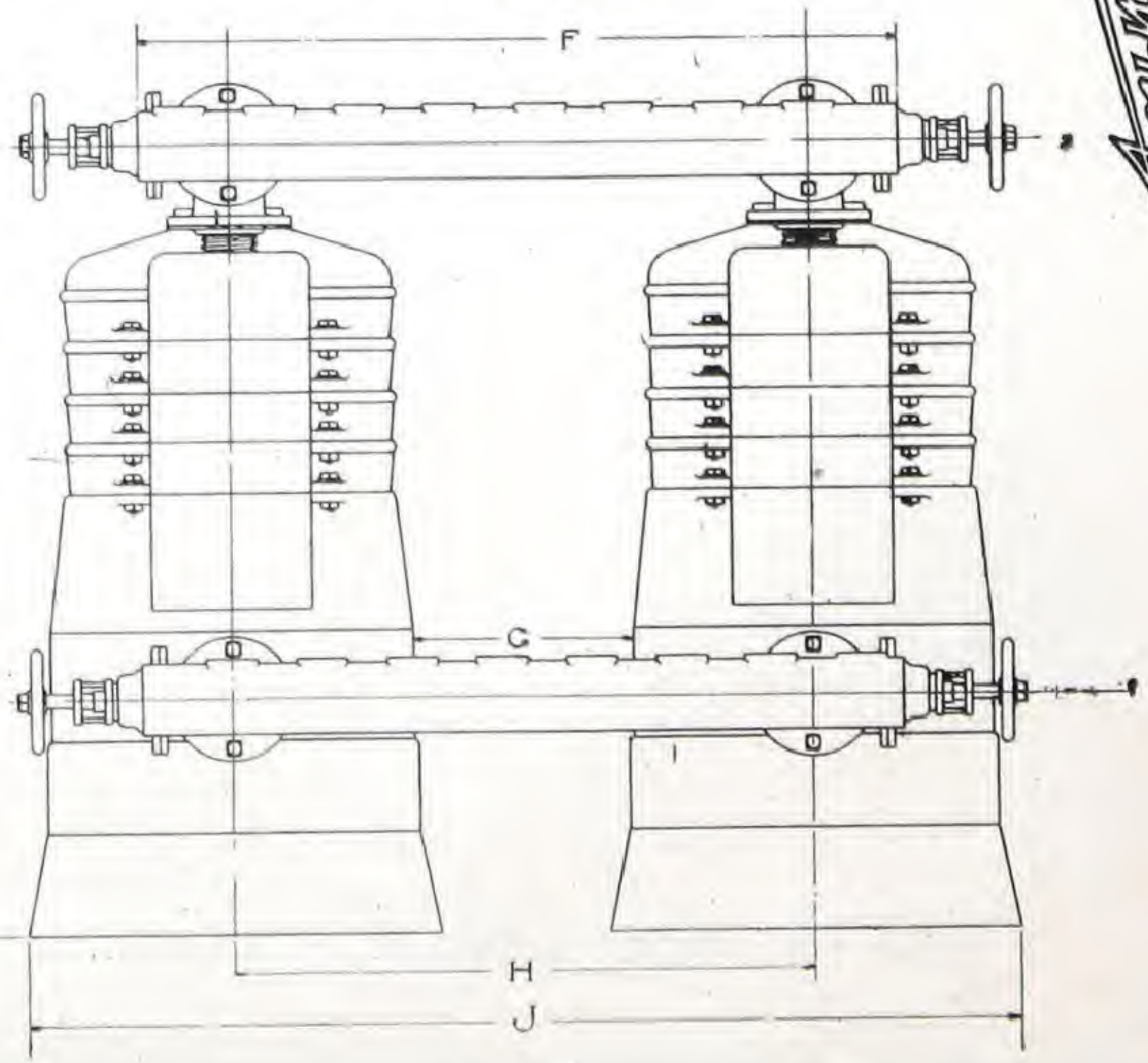
All measurements given in inches. See page 13 for further details.

OXFORD "B" SERIES HOT WATER BOILERS

With Twin Connections.



Standard Dimensions.



Gurney

TWIN CONNECTIONS FOR "B" SERIES OXFORD HOT WATER BOILERS

Standard Dimensions

Number of Boiler	Total Height to top of Flow Header	Top of Return to top of Flow Header	Height from Floor to top of Return	From Front of Base to Back of Return Header	E+D- Over-all Dimensions	Length of Flow and Return Headers	Distance between Firepots	Centre to Centre of Boilers	Width of Boilers Over Bases	Sizes of Valves	Inside Diameter of Headers	Number of Tappings	Size of Standard Tappings, inches	Width of Valves Face to Face
	A	B	C	D	E	F	G	H	J					
6½-C	77	51½	25¾	79	3½	107	11½	50	89½	5	7	16	2	8¾
7-B	76	50¾	25½	83½	3½	107	9¼	50	90	5	7	16	2	8¾
8-C	78	52¾	25½	85¾	3½	107	7¾	50	91	5	7	16	2	8¾
9-D	76½	50½	26	87	3½	133	10	54	100	6	8	20	2	9½
10-E	80½	54	26½	90½	3½	133	9	60	106	6	8	20	2	9½

All measurements given in inches. See page 15 for further details.

Standard

TWIN ROUND HOT WATER BOILERS

Illustrating two of our Round Hot Water Boilers twinned together; the ideal installation for residence and other large work.

See detail of measurements on preceding pages.

Gurney

Gurney

OXFORD ROUND STEAM BOILERS

Shipped with "F" Base.

The Insloped Walls, the big First Section, Push Nipple Joints, Gear Driven Grate Bars, Big Steam Space, are a few of the features of this Boiler.

Gurney

OXFORD STEAM BOILERS.

For Hard or Soft Coal, Coke or Natural Gas.

Dimensions and Capacities

No.	Outside Diameter of Boiler, Inches	Height to Smoke Outlet, Inches Low Base	Height of Water Line, Inches Low Base	Diameter of Grate, Inches	Grate Area, Square Feet	Capacity, Feet*	Size Main Outlet, Inches	Size Return Outlet, Inches	Diameter of Smoke Collar, Inches
00 F	22	53	41	17 1/4	1 2/3	200	2	1 1/2	7
10 F	22	56 1/2	44 1/2	17 1/4	1 2/3	250	2	1 1/2	7
20 F	24	58 1/2	44 1/2	20 1/4	2 1/4	350	2 1/2	2	7
30 F	27	60	45 1/2	22 1/4	2 3/4	450	3	2	8
40 F	29	61	47	25 1/4	3 1/2	550	3	2	8
50 F	33	62	47 1/2	27 1/4	4	700	3	2	10
60 F	34	63	57 1/2	29 1/4	4 2/3	900	3 1/2	2 1/2	10
60 1/2 C	38	70	54	32 1/4	5 2/3	1,000	3 1/2	2 1/2	10
70 B	43 1/2	73	57	35 1/4	6 2/3	1,275	4	2 1/2	11

Regular steam trimmings included, are: Steam Gauge, Saftey Valve, Water Column, Glass Water Gauge, Gauge Cocks, Automatic Damper Regulator, also Cleaning Brush.

Make due allowance for mains and risers when selecting size of boiler required. All mains and boilers should be covered.

Direct-indirect radiation requires 40% more boiler capacity. Indirect requires 75% increased boiler capacity.

APPROXIMATE SHIPPING WEIGHTS OXFORD STEAM BOILERS.

No.	Low Base	No.	Low Base
00 F	1,050 lbs.	**50 F**	2,180 lbs.
10 F	1,125 "	**60 F**	2,625 "
20 F	1,325 "	**60 1/2 C**	3,500 "
30 F	1,575 "	**70 B**	3,600 "
40 F	1,750 "		

ALL RATINGS ARE GROSS.

*See page 2.

Gurney

SOFT COAL OR LIGNITE BOILERS

STEAM **HOT WATER.**

Wherever soft coal or lignite is the fuel used, particular attention is called to the Gurney 917, 924A, 930 and 940 Series Steam and Hot Water Boilers, and the Cottage Hot Water Heater.

The combustion space is ample and the flues are easily accessible so that all surfaces may be kept clean, with the result that there is the greatest return for the fuel burned.

Made in 23 different sizes. See details on the several pages listing these boilers.

Gurney

917 SERIES GURNEY STEAM BOILER.

This series boiler is fitted with direct damper operated from front of boiler, a very desirable feature for starting occasional fires with soft coal in spring and fall of year.

No.	*Rating Feet Gross	Outside		Size of Grate Ins.	Flows. Ins.	Returns Ins.	Approximate Shipping Weight Lbs.
		Width Inches	Length Inches				
914S	600	29 1/8	43 1/2	17 x 30	2-4	2-2 1/2	1,900
915S	800	29 1/8	51 1/4	17 x 39	2-4	2-2 1/2	2,200
916S	1,000	29 1/8	60	17 x 48	2-4	2-2 1/2	2,600
917S	1,150	29 1/8	68 3/4	17 x 57	2-4	2-2 1/2	3,000

Regular steam trimmings included.

For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

Gurney

917 SERIES GURNEY HOT WATER BOILER.

This series boiler is fitted with direct damper operated from front of boiler, a very desirable feature for starting occasional fires with soft coal in spring and fall of year.

No.	*Rating Feet Gross	Outside Width Inches	Outside Length Inches	Size of Grate, Ins.	Flows, Ins.	Returns, Ins.	Approximate Shipping Weight Lbs.
914W	1,000	29 1/8	43 1/2	17 x 30	2-4	2-4	1,900
915W	1,325	29 1/8	51 1/4	17 x 39	2-4	2-4	2,200
916W	1,650	29 1/8	60	17 x 48	2-4	2-4	2,600
917W	1,975	29 1/8	68 3/4	17 x 59	2-4	2-4	3,000

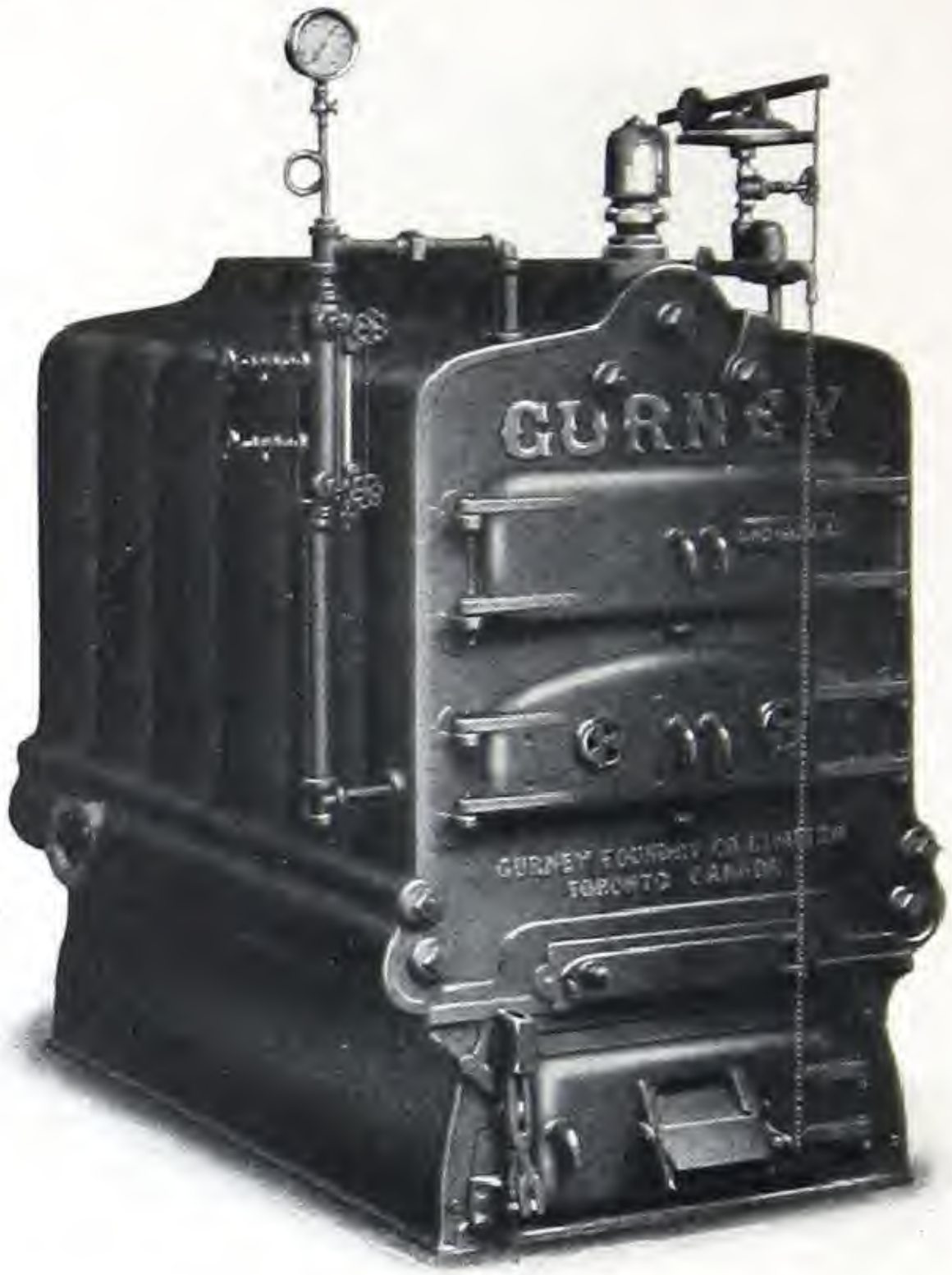
For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

Gurney



924A SERIES GURNEY STEAM BOILER.

No.	*Rating Feet Gross	Outside		Size of Grate, Ins.	Flows, Ins.	Returns, Ins	Approximate Shipping Weight Lbs.
		Width Inches	Length Inches				
924A	1,000	36	36	24 x 31	2-4	2-2	2,400
925A	1,250	36	45	24 x 40	2-4	2-2	2,900
926A	1,500	36	54	24 x 49	2-4	2-2	3,300
927A	1,850	36	63	24 x 58	2-4	2-2	3,800

Regular steam trimmings included.

For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

Gurney

924A GURNEY HOT WATER BOILER.

No.	*Rating Feet Gross	Outside		Size Grate Inches	Flows, Inches	Returns Inches	Approximate Shipping Weight Lbs.
		Width Inches	Length Inches				
924A	1,650	36	36	24 x 31	2-4	2-4	2,300
925A	2,075	36	45	24 x 40	2-4	2-4	2,800
926A	2,500	36	54	24 x 49	2-4	2-4	3,300
927A	3,100	36	63	24 x 58	2-4	2-4	3,700

For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

930 SERIES GURNEY STEAM BOILER.

No.	*Rating Feet Gross	Outside Width Inches	Outside Length Inches	Size of Grate, Inches	Flows, Inches	Returns Inches	Approximate Shipping Weight Lbs.
935S	1,650	44	51	30 x 37	2-5	2-3	3,800
936S	2,000	44	60	30 x 46	2-5	2-3	4,500
937S	2,350	44	68	30 x 54	3-5	3-3	5,100
938S	2,700	44	77	30 x 63	3-5	4-3	5,800
939S	3,000	44	86	30 x 72	3-5	4-3	6,500

Regular steam trimmings included.

For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

930 SERIES GURNEY HOT WATER BOILER.

No.	*Rating Feet Gross	Outside		Size of Grate, Inches	Flows, Inches	Returns, Inches	Approximate Shipping Weight, Lbs.
		Width Inches	Length Inches				
935W	2,725	44	51	30 x 37	2-5	2-5	3,700
936W	3,300	44	60	30 x 46	2-5	2-5	4,400
937W	3,875	44	68	30 x 54	3-5	2-5	5,000
938W	4,450	44	77	30 x 63	3-5	3-5	5,700
939W	5,000	44	86	30 x 72	3-5	3-5	6,400

For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

Gurney

940 SERIES GURNEY STEAM BOILER.

No.	*Rating Feet Gross	Outside Width, Inches	Outside Length, Inches	Size of Grate Inches	Flows, Inches	Returns, Inches	Approximate Shipping Weight Lbs.
945S	2,500	56	51	42 x 37	2-5	2-4	5,600
946S	3,125	56	60	42 x 46	2-5	2-4	6,500
947S	3,750	56	69	42 x 55	3-5	3-4	7,400
948S	4,375	56	78	42 x 64	3-5	3-4	8,300
949S	5,000	56	87	42 x 73	3-5	3-4	9,200

Regular steam trimmings included.

For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

940 SERIES GURNEY HOT WATER BOILER.

No.	*Rating Feet Gross	Outside		Size of Grate Inches	Flows, Inches	Returns, Inches	Approximate Shipping Weight Lbs.
		Width Inches	Length Inches				
945W	4,000	56	51	42 x 37	2-5	2-5	5,500
946W	5,100	56	60	42 x 46	2-5	2-5	6,400
947W	6,200	56	69	42 x 55	3-5	3-5	7,300
948W	7,300	56	78	42 x 64	3-5	3-5	8,200
949W	8,400	56	87	42 x 73	3-5	3-5	9,100

For detail measurements, see pages 34 and 35.

Make due allowance for mains and risers when selecting size of boiler required.

When soft coal or wood is used as fuel, select a size larger boiler than for hard coal.

*See page 2.

Gurney

GURNEY COTTAGE HOT WATER HEATER

The most effective low heater on the market; it has big capacity, being especially adapted to soft or lignite coal.

Very deep firepot—rocking grates, push nipple construction. The lowest heater of its capacity on the market.

Gurney

GURNEY COTTAGE HOT WATER HEATER.

Specially adapted to soft or lignite coal

Ratings, Weights, Etc.

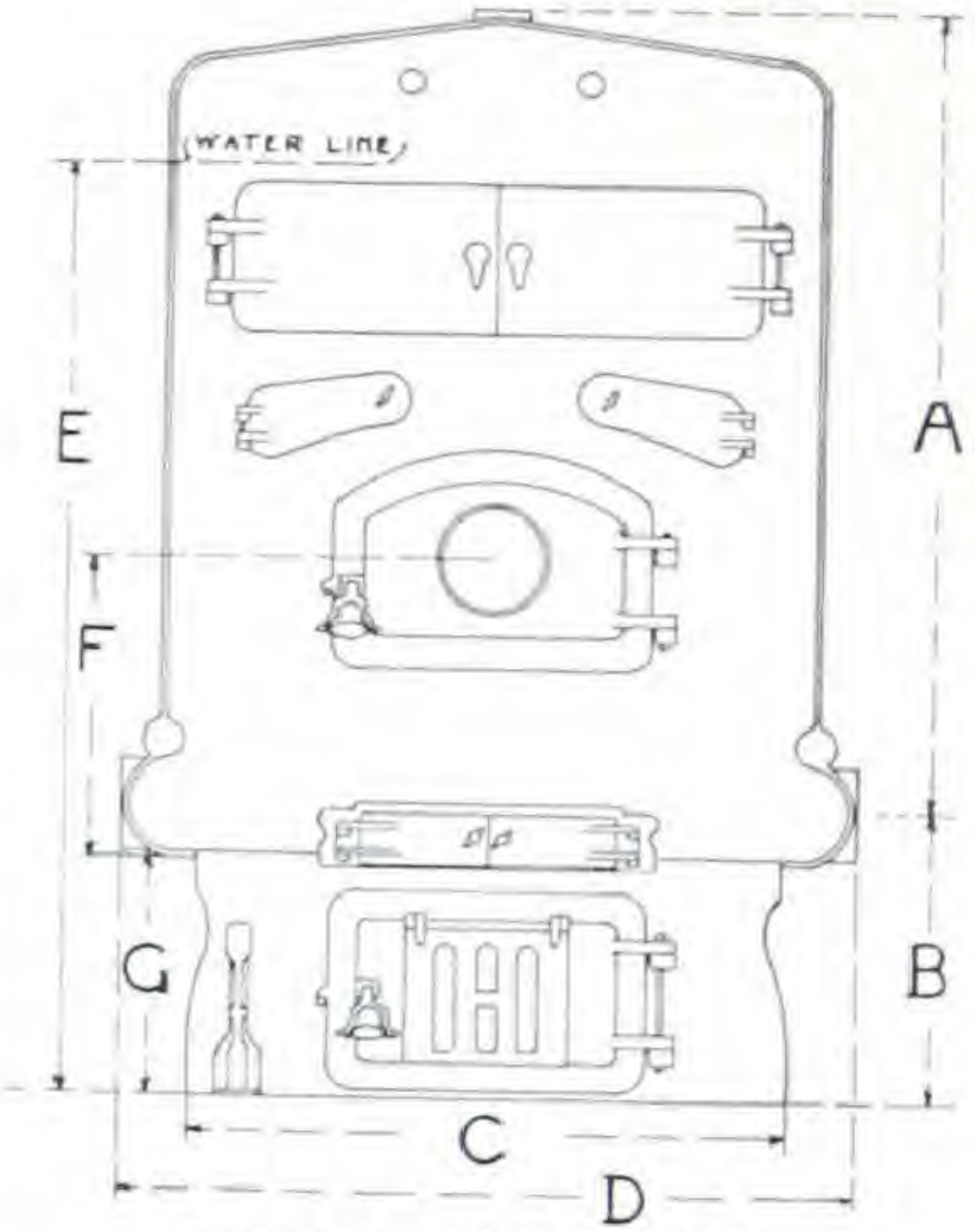
No.	*Rating Limit Feet	*Rating Gross Capacity Feet	Weight	Height of Flow Inches	Grate Size
904	275	500	850	43	18 x 16½ ins.
905	325	600	950	43	23 x 16½ ins.
906	375	700	1,050	43	27 x 16½ ins.
907	425	800	1,175	43	33 x 16½ ins.
908	475	900	1,300	43	37½ x 16½ ins.

No.	Flow Size, Ins.	Returns Size, Ins.	Smoke Pipe Inches
904	1-4	2-3	7
905	1-4	2-3	7
906	1-4	2-3	7
907	1-4	2-3	7
908	1-4	2-3	7

*See page 2.

900 SERIES GURNEY SECTIONAL BOILERS

Measurements



FRONT ELEVATION

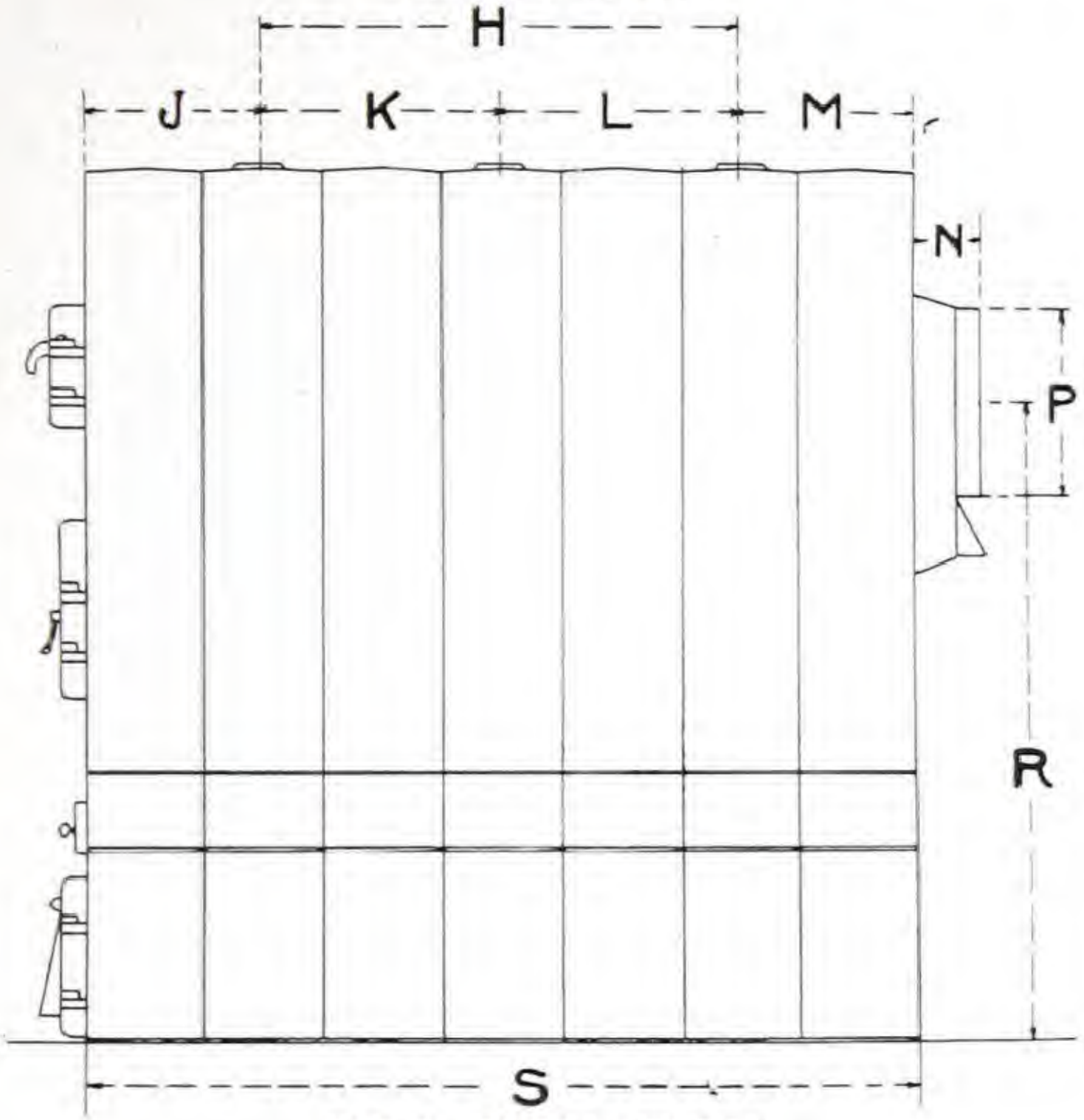
Boiler	A	B	C	D	E	F	G
914	35½	14½	24	30	39½	14½	11
915	35½	14½	24	30	39½	14½	11
916	35½	14½	24	30	39½	14½	11
917	35½	14½	24	30	39½	14½	11
924-A	38½	16⅞	29½	36½	43	15	14
925-A	38½	16⅞	29½	36½	43	15	14
926-A	38½	16⅞	29½	36½	43	15	14
927-A	38½	16⅞	29½	36½	43	15	14
935	47	17	35	44	56	18½	14
936	47	17	35	44	56	18½	14
937	47	17	35	44	56	18½	14
938	47	17	35	44	56	18½	14
939	47	17	35	44	56	18½	14
945	54½	18	47½	57	60	20	14
946	54½	18	47½	57	60	20	14
947	54½	18	47½	57	60	20	14
948	54½	18	47½	57	60	20	14
949	54½	18	47½	57	60	20	14

Above dimensions are in inches.

900 SERIES GURNEY SECTIONAL BOILERS

Gurney

Measurements

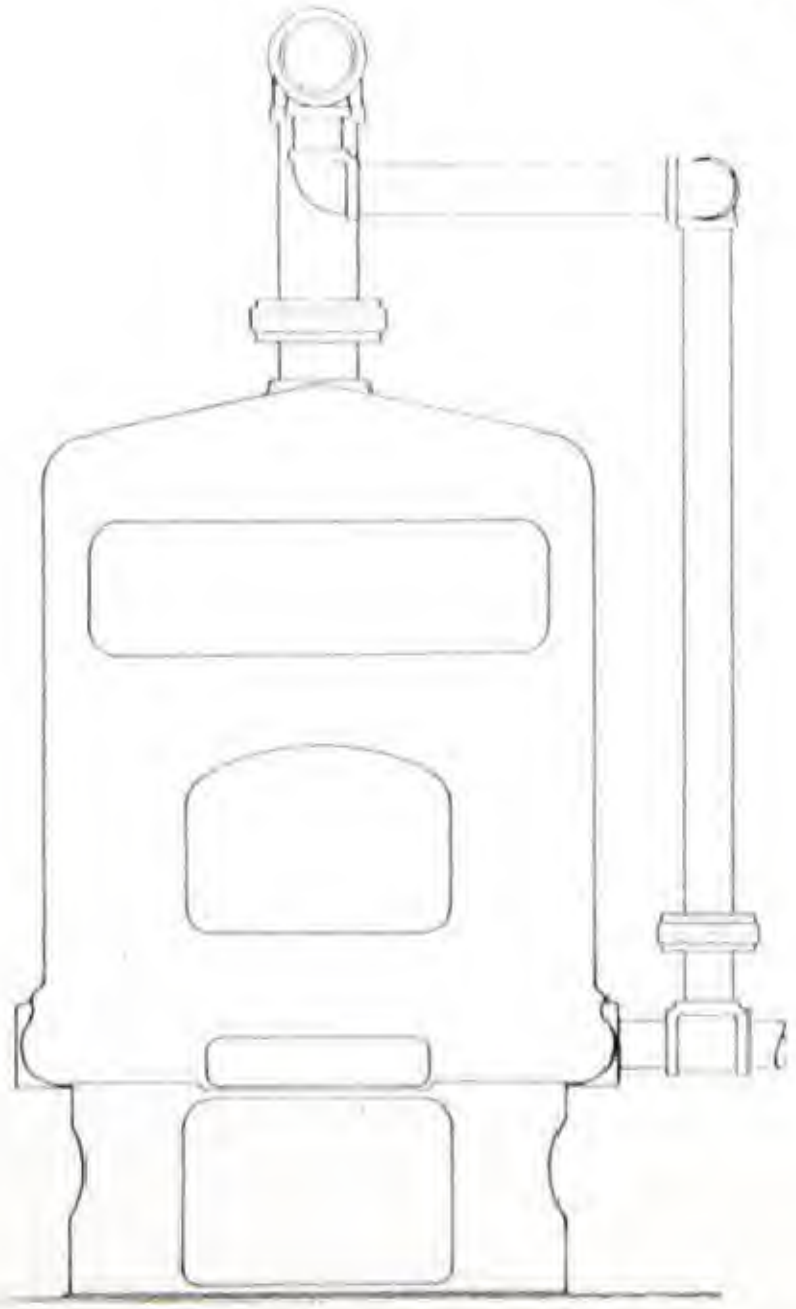


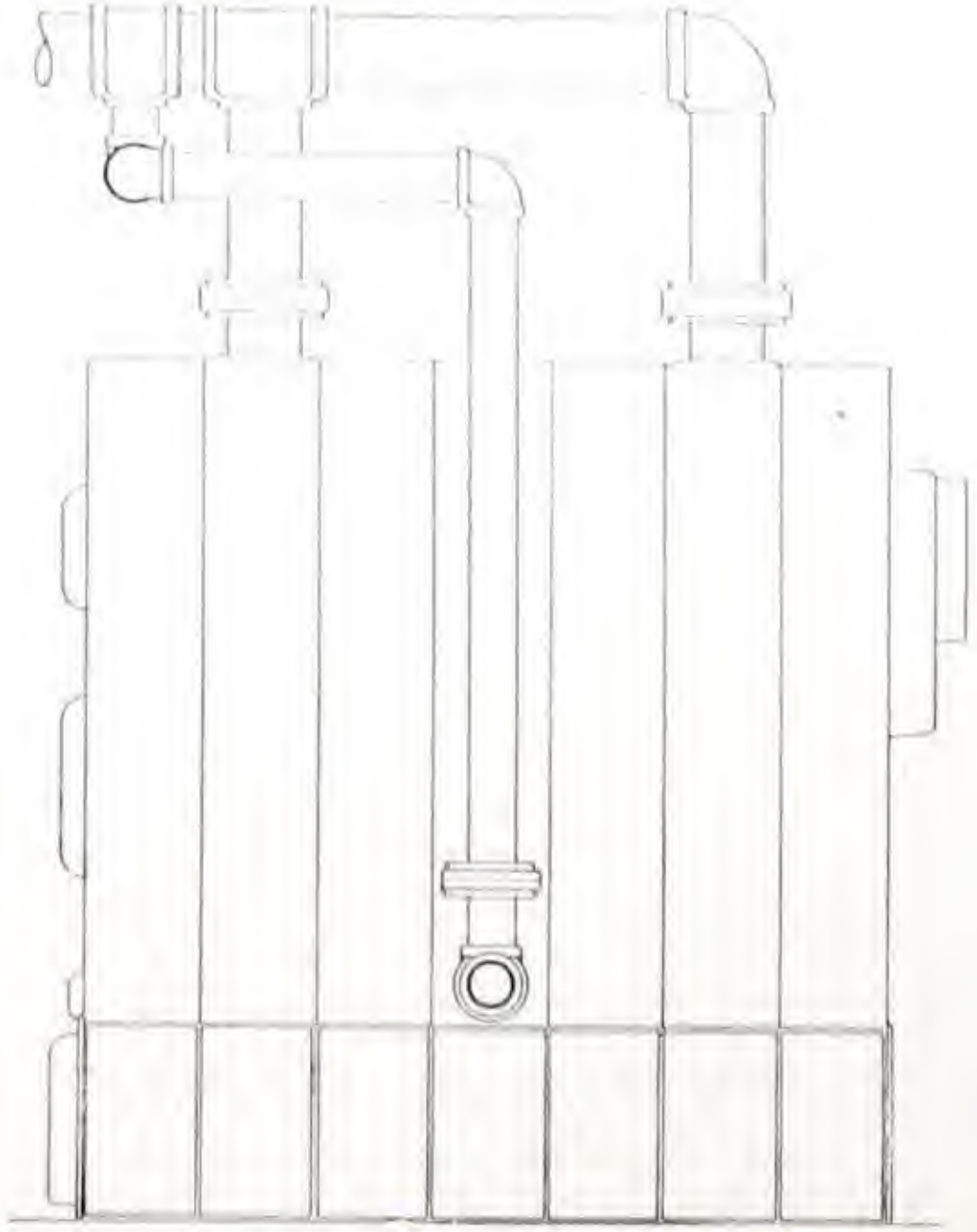
SIDE ELEVATION

No. of Boiler	H	J	K	L	M	N	P	R	S
914	8¾	13	...	...	13	7	9	35	37¼
915	17¾	13	...	...	13	7	9	35	46½
916	26¾	13	...	...	13	7	9	35	55¼
917	35¾	13	17⅞	17⅞	13	7	9	35	64
924-A	9	13½	...	...	13½	5½	12	39½	37½
925-A	18	13½	...	...	13½	5½	12	39½	46½
926-A	27	13½	...	...	13½	5½	12	39½	55½
927-A	27	13½	...	...	13½	5½	12	39½	64½
935	18	13½	...	...	13½	5½	12	49	46½
936	27	13½	...	...	13½	5½	12	49	55½
937	36	13½	18	18	13½	5½	12	49	64½
938	45	13½	18	27	13½	5½	12	49	73½
939	54	13½	27	27	13½	5½	12	49	82½
945	18	13½	...	...	13½	5¾	15	52	46½
946	27	13½	...	...	13½	5¾	15	52	55½
947	36	13½	...	...	13½	5¾	15	52	64½
948	45	13½	18	27	13½	5¾	15	52	73½
949	54	13½	27	27	13½	5¾	15	52	82½

Above dimensions are in inches.

BOILER CONNECTIONS

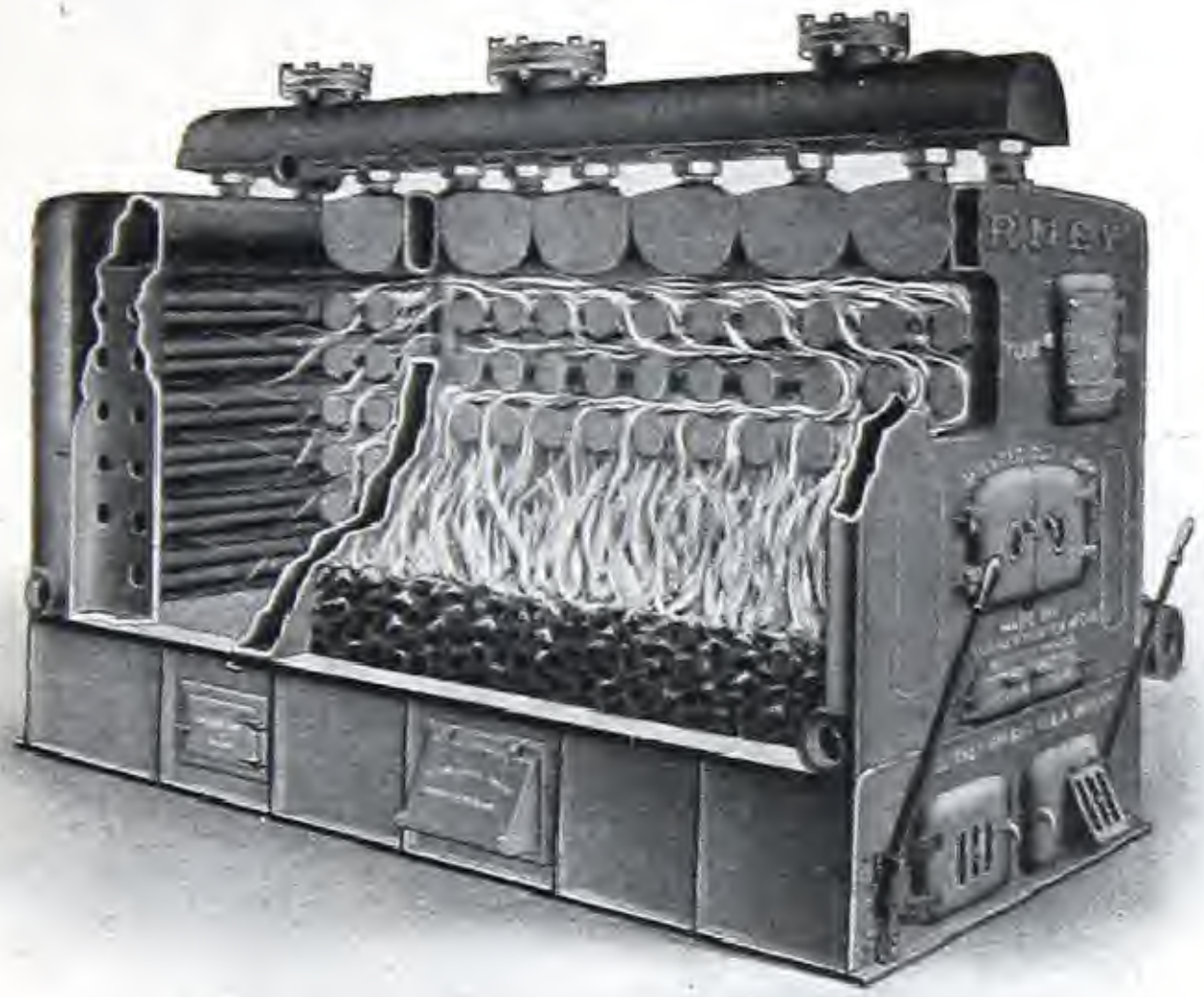




Showing correct method of connecting equalizing pipe from flow main to the return entering boiler.

Equalizing pipe for Series 917 and 924A-2", 930-2½", 940-3".

Gurney



GURNEY "BRIGHT IDEA" BOILERS

A water tube sectional boiler with headers.

3 Grate Widths. Capacity, Water 2,000 to 13,500 ft.; Steam 1,250 to 8,300 ft.

Note large heating surface in water tube construction. Each section is independent and may be blanked off if desirable.

Note long fire travel. Header construction appeals to many heating engineers. Half section construction is proof against expansion cracks.

Gurney

GURNEY BRIGHT IDEA STEAM BOILER.

For Hard Coal, Soft Coal or Coke.

STEAM

Ratings and Weights

No.	Capacity, Feet*	Height of water Line, inches	Size Grate, Inches	Flow Outlets, Inches	Return Outlet, Inches	Diameter Smoke Collar, Inches	Approximate Shipping Weights
1,021	1,500	53½	28 x32	2-4	2-3	12	4,000
1,022	1,750	53½	28 x 38	2-4	2-3	12	4,400
1,023	2,000	53½	28 x 44	2-4	2-3	12	4,900
1,024	2,250	53½	28 x 50	3-4	3-3	12	5,400
1,025	2,500	53½	28 x 56	3-4	3-3	12	5,900
1,130	2,800	57	40 x 44	1-6 and 1-4	2-4	14	7,200
1,131	3,200	57	40 x 50	1-6 and 1-4	2-4	14	7,800
1,132	3,600	57	40 x 56	1-6 and 1-4	2-4	14	8,400
1,133	3,900	57	40 x 62	1-6 and 1-4	2-4	14	9,000
1,250	4,500	58	48 x 51	2-6	2-4	20	11,500
1,251	5,300	58	48 x 58	2-6	2-4	20	13,000
1,252	6,000	58	48 x 65	2-6	2-4	20	14,400
1,253	6,800	58	48 x 72	3-6	3-4	20	15,700
1,254	7,500	58	48 x 72	3-6	3-4	20	17,800
1,255	8,300	58	48 x 72	3-6	3-4	20	20,000

All ratings are gross. Allow for radiation of piping when selecting size of Boiler.

Direct-indirect radiation requires 40% increased boiler power.

Indrect radiation requires 75% increased boiler power.

For other measurements see pages 40 and 41.

*See page 2.

Gurney

GURNEY BRIGHT IDEA HOT WATER BOILER.

For Hard Coal, Soft Coal or Coke.

HOT WATER

Ratings and Weights

No.	Capacity, Feet*	Size Grate, Inches	Main Outlet, Inches, Flow and Return	Diameter Smoke Collar, Inches	Approximate Shipping Weights
1,021	2,400	28 x 32	2-4	12	4,000
1,022	2,800	28 x 38	2-4	12	4,400
1,023	3,200	28 x 44	3-4	12	4,900
1,024	3,600	28 x 50	3-4	12	5,400
1,025	4,000	28 x 56	3-4	12	5,900
1,130	4,600	40 x 44	1-6 and 1-4	14	7,200
1,131	5,200	40 x 50	1-6 and 1-4	14	7,800
1,132	5,800	40 x 56	1-6 and 1-4	14	8,400
1,133	6,400	40 x 62	1-6 and 1-4	14	9,000
1,250	7,300	48 x 51	2-6	20	11,500
1,251	8,500	48 x 58	2-6	20	13,000
1,252	10,000	48 x 65	2-6	20	14,400
1,253	11,000	48 x 72	3-6	20	15,700
1,254	12,500	48 x 72	3-6	20	17,800
1,255	13,500	48 x 72	3-6	20	20,000

All ratings are gross, allow for radiation of piping when selecting size of boiler.

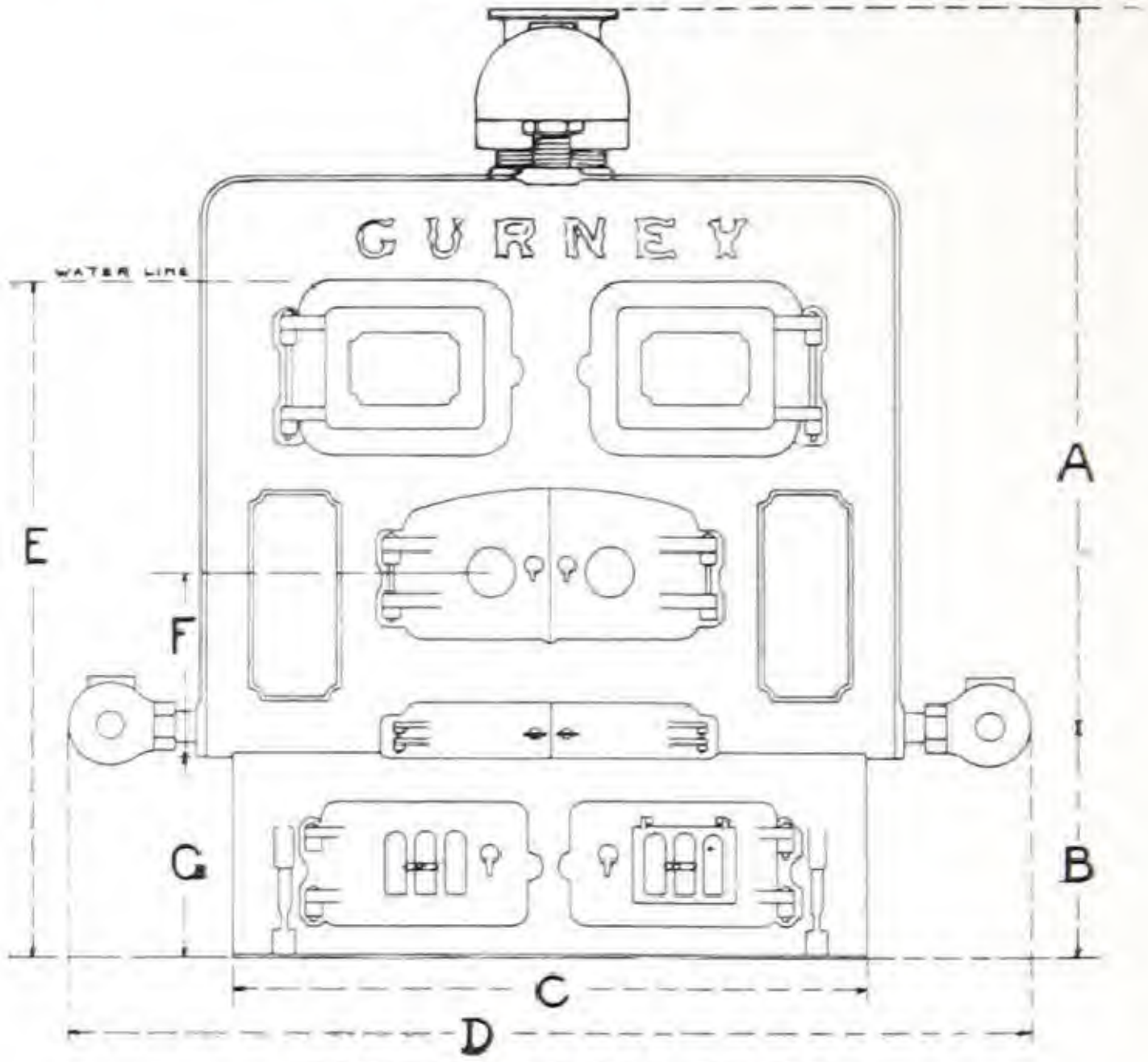
For other measurements see pages 40 and 41.

*See page 2.

Gurney

BRIGHT IDEA SECTIONAL BOILERS

Measurements



FRONT ELEVATION

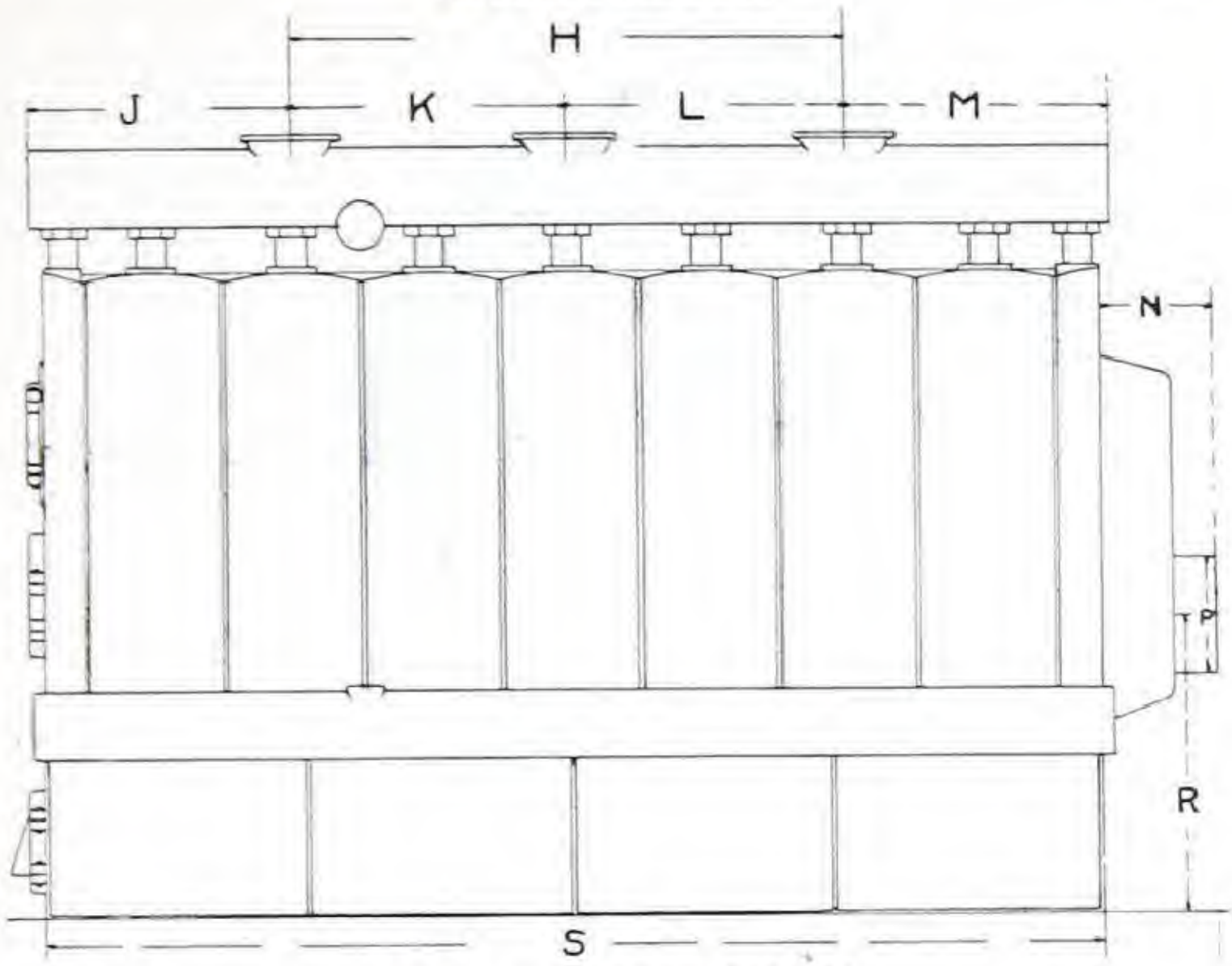
No. of Boiler	A	B	C	D	E	F	G
1021	56¼	16¼	35½	57	53½	13¾	13¾
1022	56¼	16¼	35½	57	53½	13¾	13¾
1023	56¼	16¼	35½	57	53½	13¾	13¾
1024	56¼	16¼	35½	57	53½	13¾	13¾
1025	56¼	16¼	35½	57	53½	13¾	13¾
1130	57	18¾	48½	72	57	13¼	16¼
1131	57	18¾	48½	72	57	13¼	16¼
1132	57	18¾	48½	72	57	13¼	16¼
1133	57	18¾	48½	72	57	13¼	16¼
1250	60½	19¼	55	86	58	19¼	16⅜
1251	60½	19¼	55	86	58	19¼	16⅜
1252	60½	19¼	55	86	58	19¼	16⅜
1253	60½	19¼	55	86	58	19¼	16⅜
1254	60½	19¼	55	86	58	19¼	16⅜
1255	60½	19¼	55	86	58	19¼	16⅜

Above dimensions are in inches.

Gurney

BRIGHT IDEA SECTIONAL BOILERS

Measurements



SIDE ELEVATION

No. of Boiler	H	J	K	L	M	N	P	R	S
1021	14	15½	...	...	12	12½	12	25¼	38
1022	17	15½	...	...	15	12½	12	25¼	44
1023	23	15½	...	...	15	12½	12	25¼	50
1024	28	15½	14	14	16	12½	12	25¼	56
1025	30	15½	15	15	20	12½	12	25¼	62
1130	22	16½	...	...	15	13¼	16	27⅞	52½
1131	27½	16½	...	...	15	13¼	16	27⅞	58½
1132	33½	16½	...	...	15½	13¼	16	27⅞	64½
1133	33½	16½	...	...	21½	13¼	16	27⅞	70½
1250	26	16	...	...	31½	7	20	28⅜	71
1251	26	16	...	...	38	7	20	28⅜	78
1252	26	16	...	...	46	7	20	28⅜	85
1253	52	16	26	26	34	7	20	28⅜	99
1254	52	16	26	26	48	7	20	28⅜	106
1255	52	16	26	26	57½	7	20	28⅜	120

Above dimensions are in inches.

For Smoke Pipe Connections at back add 18 in. for the 1000 and 1100 Series, and 24 in. for 1200 Series.

Gurney

THE DORIC HEATER

A most powerful tank heater well known to the Canadian trade. It gives splendid service for heating water, as the section is one single casting without joints. Its low height makes it very desirable where there is small cellar head room.

Headers supplied as an extra.

No.	Height in Inches Low Base	Adaptable Tank size Gallons	*Capacity Net Feet Radiation	Diameter of Base in Inches	Diameter of Grate in Inches	Diameter of Smoke Outlet Inches	Approximate Shipping Weight Low Base
11 B	47½	500	335	25	20	7	940
12 B	47½	700	500	27	22	7	1,200
13 B	49½	900	670	30	24	8	1,400
14 B	49½	1,100	835	33	27	9	1,900

For **Hourly Capacities**, see page 49.

*See page 2.

Gurney

THE GOTHIC HEATER.

A very efficient heater, will be found especially suitable when large quantities of water are required for barber shops, restaurants, small greenhouses, baths, etc. It is very strongly constructed. Has a deep firepot, which ensures slow combustion and economy of fuel. No water joints.

No.	Height Inches	Diameter of Firepot, Inches	Tank Capacity Gallons	Diameter of Smoke Outlet, Inches	Sizes of Flow and Return Outlet Inches	Approximate Shipping Weights
12	35	12	225	6	1-2 Flow 2-2 Return	450
14	37	14	325	7	1-2½ Flow 2-2 Return	550
16	39	16	450	7	1-2½ Flow 2-2 Return	675

For **Hourly Capacities,** see page 49.

Gurney

Note
Economizer,
Swing Fire Door
Roller Grates
and
Ash Tray.

"B" SERIES
GURNEY JACKET HEATER

A Very Reasonable Priced Heater.

Tank Capacity, using hard coal,	75 to 100 gallons.
Diameter of Firepot	10 inches
Depth of Water Cylinder	17 inches
Height—Top of Section	27 inches
Tappings—Flow	2-1 inches
Tappings Return	1-1¼ inches
Approximate Shipping Weight	200 lbs.

Note.—Where head room is extremely limited this heater can be supplied with a shallower water cylinder at same list price.

Gurney

RANCHER WATER HEATER

Water Heating Laundry Stove.

A CERTAIN WASH DAY FAVORITE.

An Up-to-Date Laundry Stove that will also heat a 30 gallon water Tank.

Outlets may face either right or left, changeable on the job.

Details:

Size of top, No. 138.....14 x 20 inches
Size of top, No. 139.....15 x 21½ inches
Flow and Return.....1 inch
Height from floor.....21 inches
Shipping Weight .....100 lbs.
No. 139 takes 9-inch pit bottom wash boiler.
No. 138 takes 8-inch pit bottom wash boiler.
Capacity using hard coal, 30 gals.

Gurney

GURNEY GAS WATER HEATERS

Gurney No. 26

A double copper coil heater of standard construction.

Gurney Ninex No. 2

A very efficient heater with nine vertical copper coils.

HOW TO CONNECT GAS WATER HEATERS

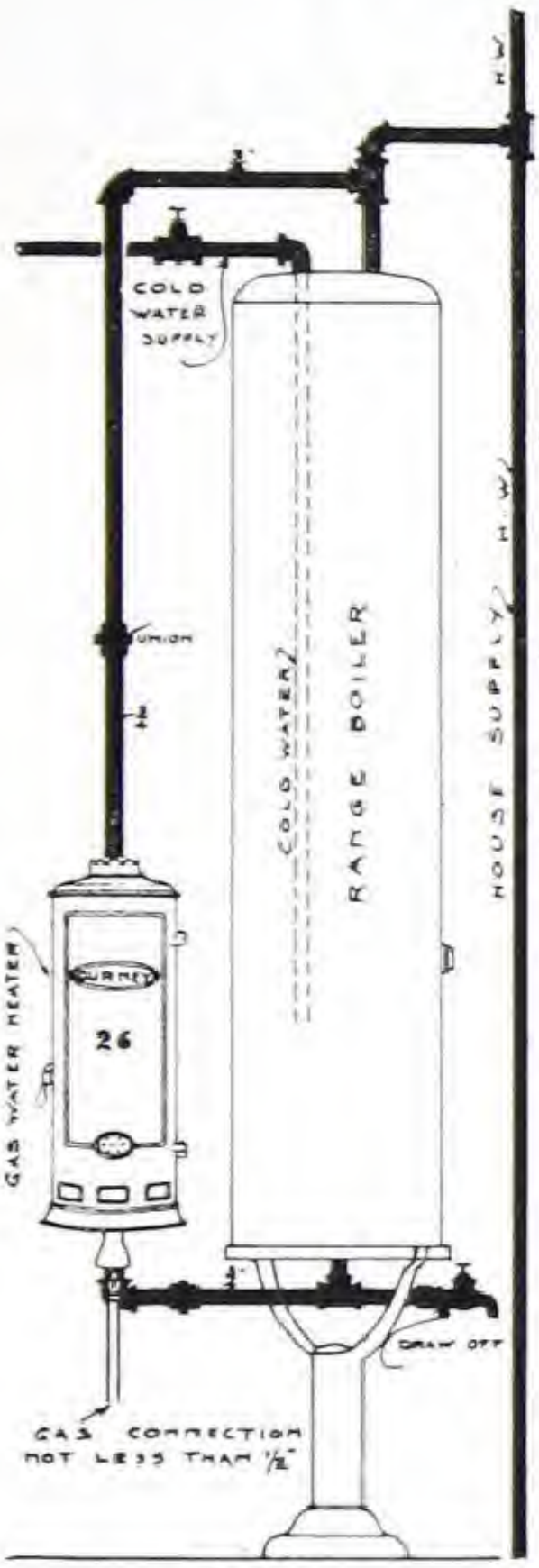


FIG 1

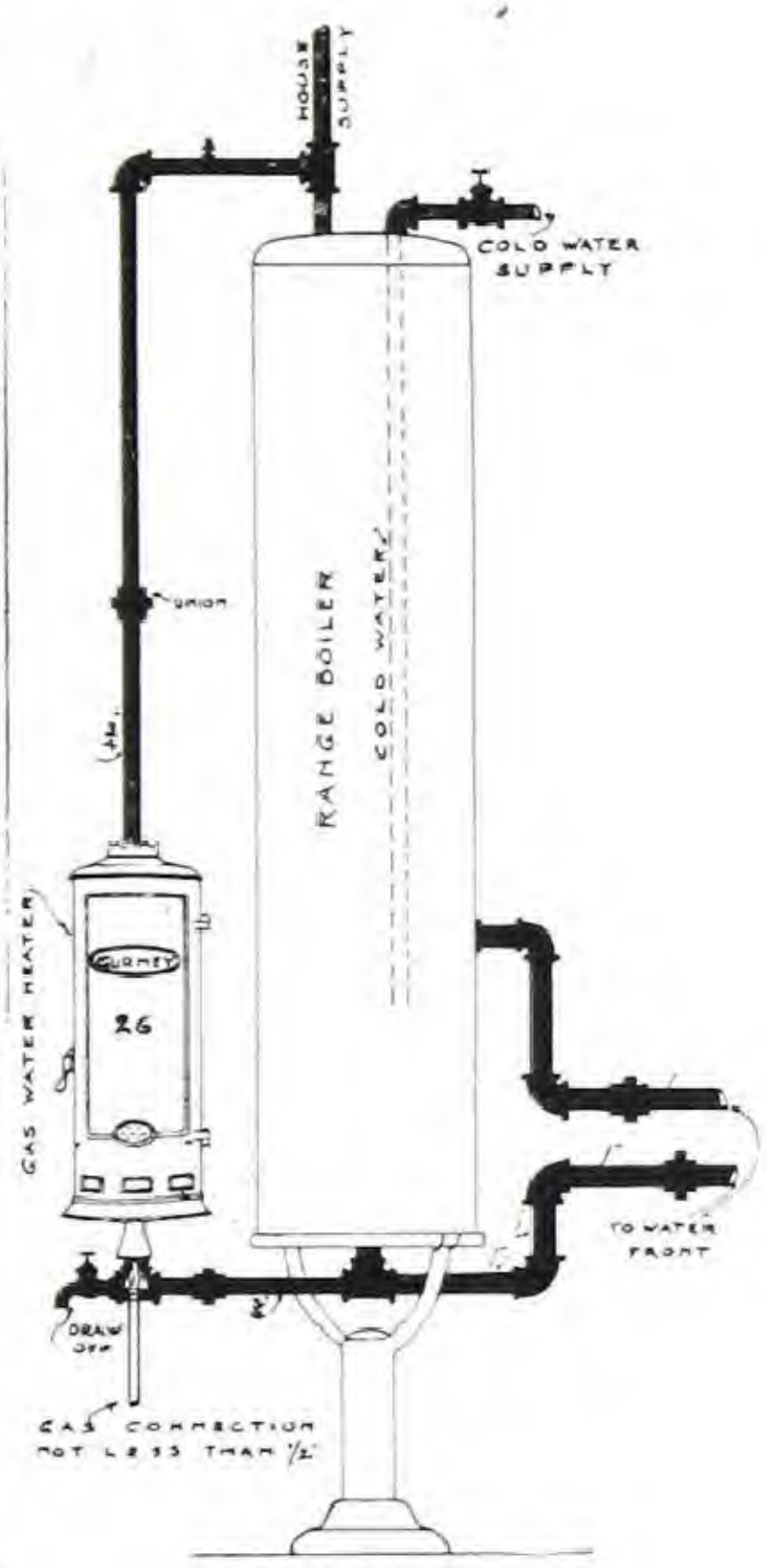


FIG. 2.

Dimensions, Etc.

	Gurney No. 26	Ninex No. 2
Length of Heater	22½"	20½"
Width of Heater	8¼"	7½"
Gas Connection	½"	½"
Fumes Connection	3"	3"
Water Connection	¾"	¾"
Approximate Shipping Weight	45 lbs.	50 lbs.

Gurney

ADAPTABLE SIZE
HOT WATER STORAGE TANK
for
GURNEY TANK HEATERS.

Where it is desired to have a fair supply of hot water at command, the following sized heaters will be found suitable where reasonable attention is given and there is a proper draft in the chimney, viz.:

Size Heater	U. S. Gallons
Rancher 138-9	30
"B" Jacket	80
Gothic No. 12	225
Gothic No. 14	325
Gothic No. 16	450
Doric No. 11B	500
Doric No. 12B	700
Doric No. 13B	900
Doric No. 14B	1100

Deduct 25% if soft coal is used.

The quantity of hot water heated and the temperature depends on the total coal consumed, and the extent to which the heater need be run will depend on the time allowed for heating the water and the demand for hot water, and this can only be determined after consideration of all the factors. A tank capacity of 10 to 12 gallons for each person in an apartment house should give good results, but this takes no account of shower baths or leaky fixtures.

For further data, see page 49.

Gurney

HOURLY CAPACITIES OF TANK HEATERS.

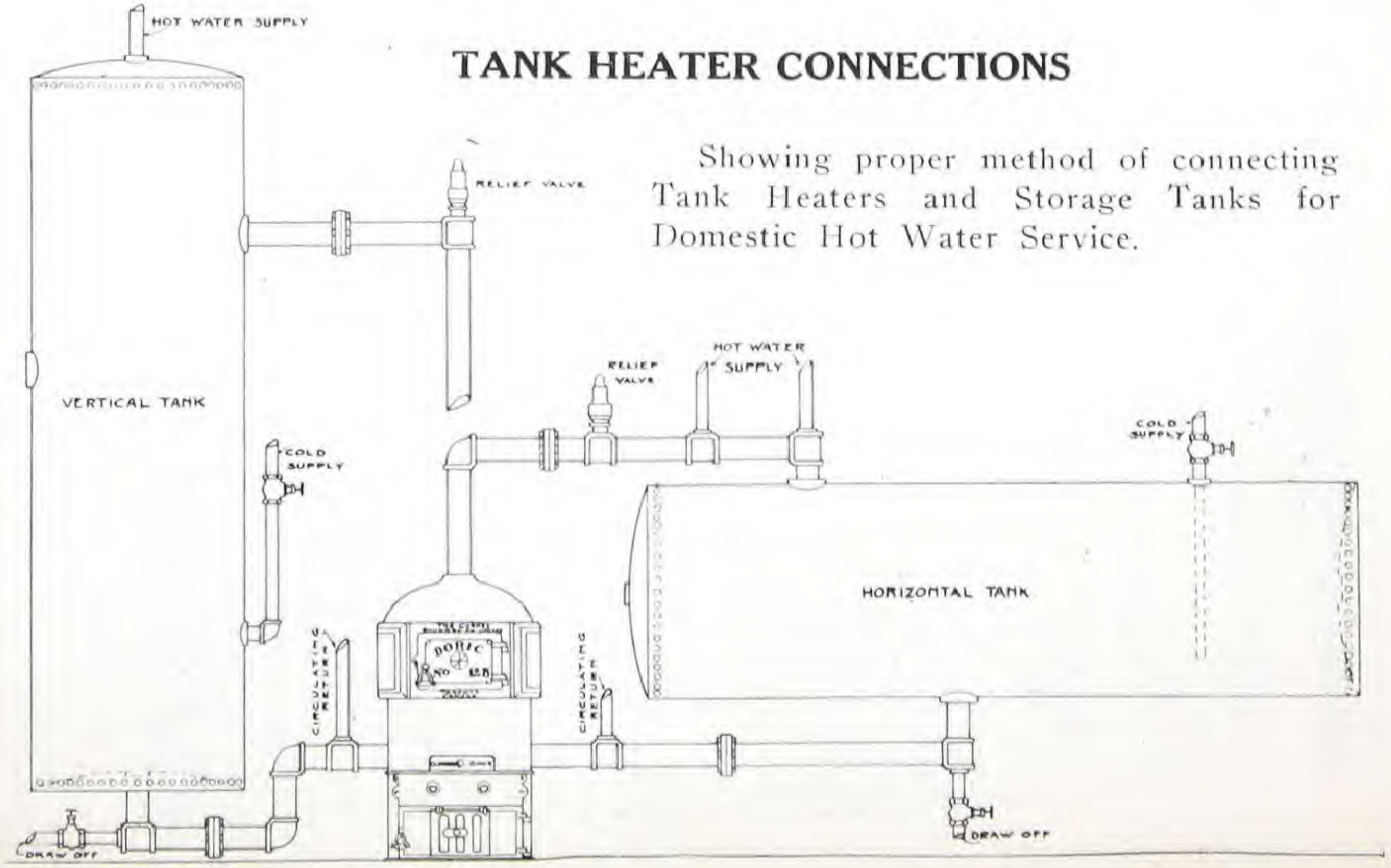
Raise in temperature 100 degrees Fahrenheit, or from 40 to 140, with varying rates of coal consumption:

Name and Size of Tank Heater	Lbs. of Coal per sq. Ft. of Grate per Hour			
	3 (Fair)	6 (Mod.)	8 (Brisk)	10 (Str.)
	U.S. Gals.	U.S.Gals.	U.S. Gals.	U.S. Gals.
Gothic No. 12.....	24	48	64	80
Gothic No. 14.....	33	66	88	110
Gothic No. 16.....	42	84	102	128
Doric No. 11B.....	66	132	176	220
Doric No. 12B.....	78	156	208	260
Doric No. 13B.....	93	186	248	310
Doric No. 14B.....	120	240	320	400

To determine the capacity of any heater under any given condition for a lower or higher temperature raise than above, multiply any one of the above quantities by 100 and divide by the desired raise in temperature, and the result will be the capacity of the heater given in the first column under such conditions. Example: How many gallons of water can be heated with a No. 16 Gothic in one hour from 50 degrees to 120 degrees Fahr. with fire burning 6 lbs. of coal per sq. ft. of grate surface per hour? Answer: 84 x 100 equals 8,400, and 120 minus 50 equals 70. Then 8,400 divided by 70 equals 120, or 120 gallons of water heated per hour from 50 degrees to 120 degrees Fahr. per hour.

TANK HEATER CONNECTIONS

Showing proper method of connecting Tank Heaters and Storage Tanks for Domestic Hot Water Service.



DATA RE TUBULAR BOILERS

Standard Dimensions Horizontal Return Tubular Boilers for Heating.

Size Diameter by Length	Nominal H.P	Heating Surface, Feet*	Tubes		Thickness		Connections		Grates		Smoke Box	Gross Rating in sq. ft. of Radiation*	Brick required		Shipping Weight Lbs.
			No.	Size	Shell	Heads	Outlet	Return	Width	Length	Diameter		Fire Brick	Common Brick	
36″ x 10 ft.	20	305	32	3″			4″	3″	30″	42″	18″	2,000	600	6,500	5,000
36″ x 12 ft.	25	365	32	3″			4″	3″	30″	48″	18″	2,400	600	7,000	5,050
42″ x 10 ft.	25	363	38	3″			5″	3″	36″	42″	20″	2,400	700	8,000	6,500
42″ x 12 ft.	35	434	38	3″			5″	3″	36″	48″	20″	2,900	700	9,000	7,000
42″ x 14 ft.	35	504	38	3″			5″	3″	36″	48″	20″	3,350	700	10,000	7,500
48″ x 10 ft.	35	484	52	3″			6″	4″	42″	42″	22″	3,200	800	10,000	7,400
48″ x 12 ft.	40	578	52	3″			6″	4″	42″	48″	22″	3,800	800	11,000	8,300
48″ x 14 ft.	45	672	52	3″			6″	4″	42″	48″	22″	4,400	800	12,000	9,200
54″ x 12 ft.	50	704	64	3″			6″	4″	48″	48″	24″	4,600	900	12,000	10,750
54″ x 14 ft.	60	818	64	3″			6″	4″	48″	48″	24″	5,200	900	12,000	12,000
60″ x 12 ft.	60	849	78	3″			7″	5″	54″	48″	26″	5,400	950	14,000	11,400
60″ x 14 ft.	70	987	78	3″			7″	5″	54″	54″	26″	6,500	900	15,500	14,250
60″ x 16 ft.	80	1,055	62	3½″			7″	5″	54″	60″	28″	7,000	900	17,000	16,000
66″ x 14 ft.	100	1,222	98	3″		7/16″	8″	6″	60″	54″	30″	8,000	1,000	17,500	18,000
66″ x 16 ft.	115	1,305	78	3½″		7/16″	8″	6″	60″	60″	30″	9,000	1,000	18,000	19,500
72″ x 14 ft.	115	1,410	114	3″		7/16″	8″	6″	66″	54″	34″	9,000	1,700	19,000	18,750
72″ x 16 ft.	130	1,588	96	3½″		7/16″	8″	6″	66″	60″	34″	10,500	1,800	20,000	20,500

*See page 2.

The above data represent standard practice but is not guaranteed by us.

Cumnock

Gurney

GURNEY SINGLE-COLUMN RADIATORS

Plain Only

For Steam and Water.

Width of Section	4½ inches
Width of Legs	7¾ inches
Height from Floor to Centre of Tapping	4 inches

See page 63 for complete measurements.

In ordering specify what tappings, whether right or left hand thread, also see directions for ordering radiators, pages 84 and 85.

Gurney

GURNEY SINGLE-COLUMN RADIATORS

For Steam and Water.

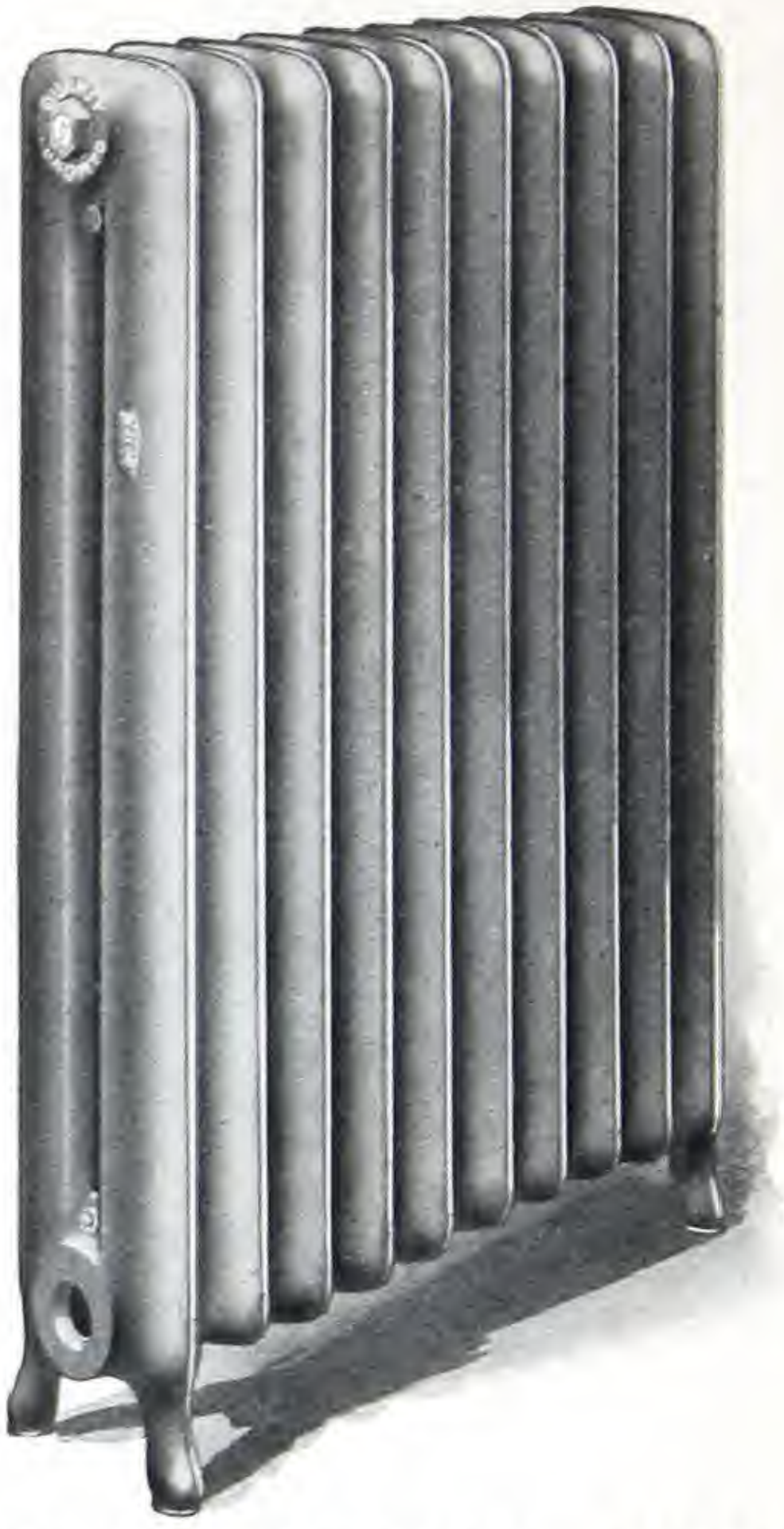
Number of Sections	Length 2½ in. per sec.	Heating Surface—Feet*			
		38 inch 3 feet* per sec.	32 inch 2½ feet* per sec.	26 inch 2 feet* per sec.	20 inch 1½ feet* per sec.
2	5	6	5	4	3
3	7½	9	7½	6	4½
4	10	12	10	8	6
5	12½	15	12½	10	7½
6	15	18	15	12	9
7	17½	21	17½	14	10½
8	20	24	20	16	12
9	22½	27	22½	18	13½
10	25	30	25	20	15
11	27½	33	27½	22	16½
12	30	36	30	24	18
13	32½	39	32½	26	19½
14	35	42	35	28	21
15	37½	45	37½	30	22½
16	40	48	40	32	24
17	42½	51	42½	34	25½
18	45	54	45	36	27
19	47½	57	47½	38	28½
20	50	60	50	40	30
21	52½	63	52½	42	31½
22	55	66	55	44	33
23	57½	69	57½	46	34½
24	60	72	60	48	36
25	62½	75	62½	50	37½
26	65	78	65	52	39
27	67½	81	67½	54	40½
28	70	84	70	56	42
29	72½	87	72½	58	43½
30	75	90	75	60	45

See page 63 for complete measurements.

All dimensions for lengths of Radiators are from outside to outside of tapping bosses—no bushings used.

*See page 2.

Gurney



GURNEY TWO-COLUMN RADIATORS

BEAVER PATTERN.

Plain Only

For Steam and Water.

See page 63 for complete measurements.

In ordering, specify what tappings, whether right or left thread; also see directions for ordering Radiators, pages 84 and 85.

GURNEY TWO-COLUMN RADIATORS

BEAVER PATTERN

For Steam and Water

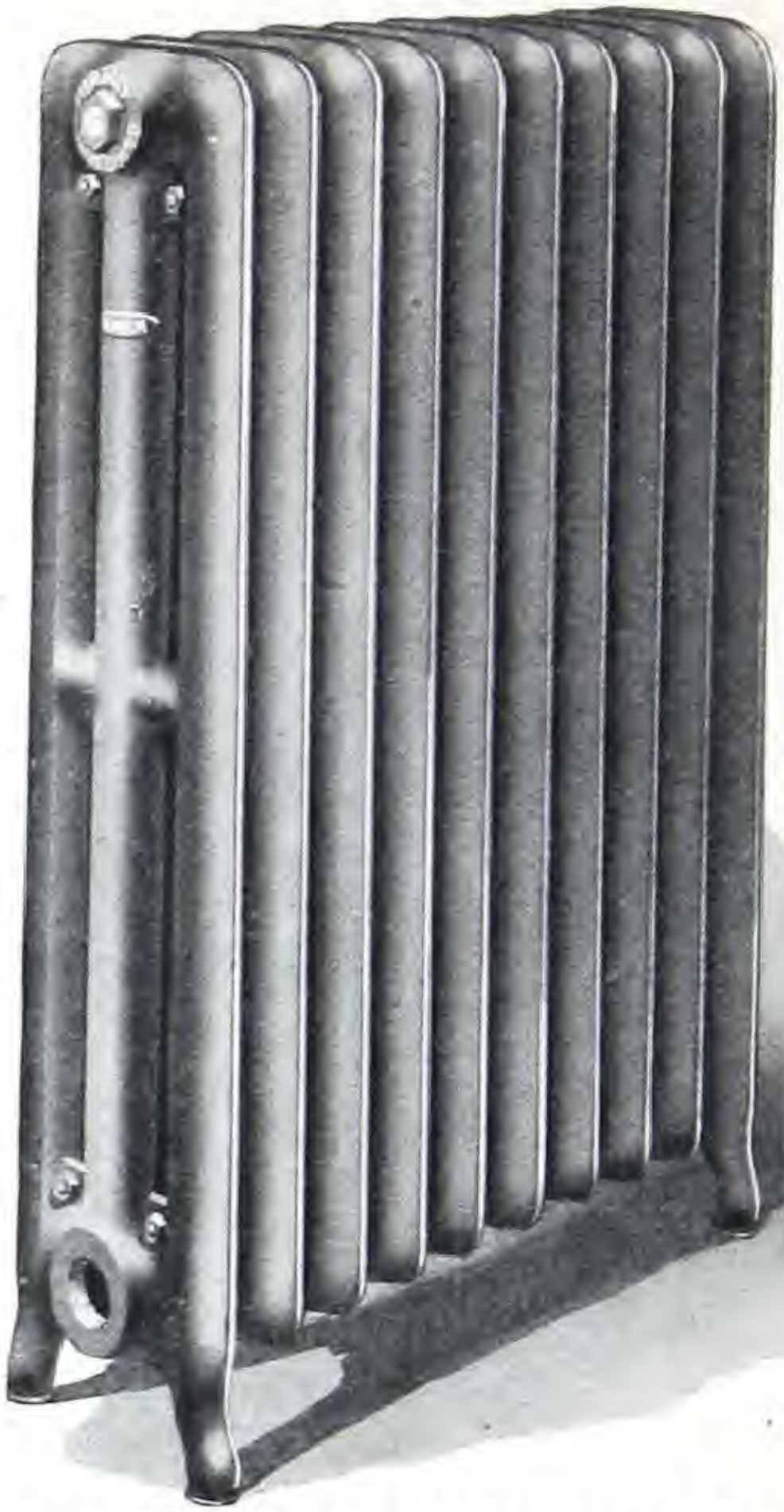
No. of Sections	Length 2½ in. per sec.	Heating Surface—Feet*					
		45 in. High, 5 ft.* per sec.	38 in. High. 4 ft.* per sec.	32 in. High, 3⅓ ft.* per sec.	26 in. High, 2⅔ ft.* per sec.	23 in. High, 2⅓ ft.* per sec.	20 in. High, 2 ft.* per sec.
2	5	10	8	6⅔	5⅓	4⅔	4
3	7½	15	12	10	8	7	6
4	10	20	16	13⅓	10⅔	9⅓	8
5	12½	25	20	16⅔	13⅓	11⅔	10
6	15	30	24	20	16	14	12
7	17½	35	28	23⅓	18⅔	16⅓	14
8	20	40	32	26⅔	21⅓	18⅔	16
9	22½	45	36	30	24	21	18
10	25	50	40	33⅓	26⅔	23⅓	20
11	27½	55	44	36⅔	29⅓	25⅔	22
12	30	60	48	40	32	28	24
13	32½	65	52	43⅓	34⅔	30⅓	26
14	35	70	56	46⅔	37⅓	32⅔	28
15	37½	75	60	50	40	35	30
16	40	80	64	53⅓	42⅔	37⅓	32
17	42½	85	68	56⅔	45⅓	39⅔	34
18	45	90	72	60	48	42	36
19	47½	95	76	63⅓	50⅔	44⅓	38
20	50	100	80	66⅔	53⅓	46⅔	40

See page 63 for complete measurements.

All dimensions for lengths of Radiators are from outside to outside of tapping bosses—no bushings used.

*See page 2.

Gurney



GURNEY THREE-COLUMN RADIATORS

BEAVER PATTERN

Plain Only

For Steam and Water.

See page 63 for complete measurements.

In ordering, specify what tappings, whether right or left thread; also see directions for ordering Radiators, pages 84 and 85.

*See page 2.

GURNEY THREE-COLUMN RADIATORS

BEAVER PATTERN.

For Steam and Water

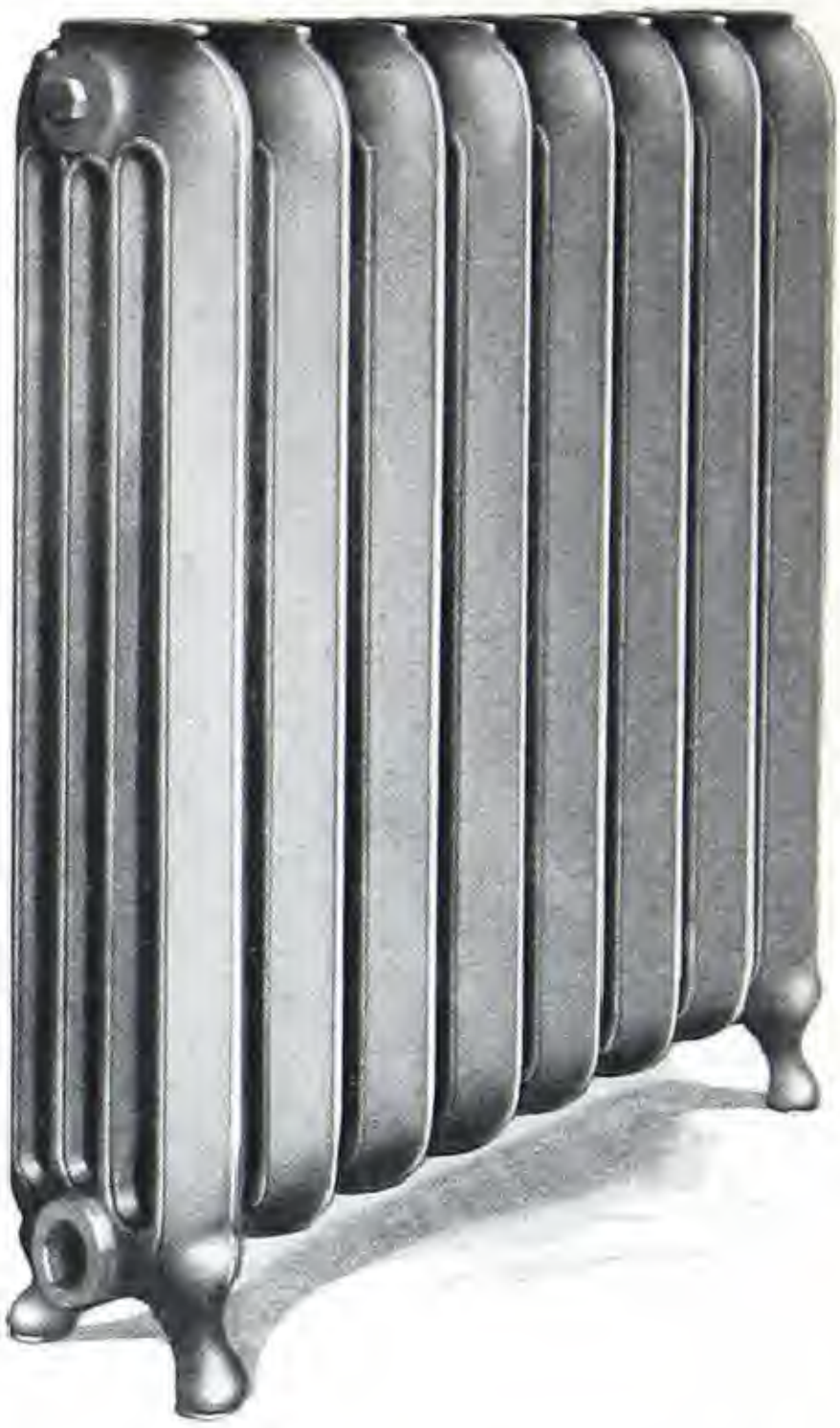
No of Sections	Length 2½ in per sec.	Heating Surface—Feet* 45 in. High 6 ft.* per sec.	38 in. High, 5 ft.* per sec.	32 in. High, 4⅓ ft.* per sec.	26 in. High, 3¾ ft.* per sec.	22 in. High 3 ft.* per sec.	18 in. High, 2¼ ft.* per sec.
2	5	12	10	9	7½	6	4½
3	7½	18	15	13½	11¼	9	6¾
4	10	24	20	18	15	12	9
5	12½	30	25	22½	18¾	15	11¼
6	15	36	30	27	22½	18	13½
7	17½	42	35	31½	26¼	21	15¾
8	20	48	40	36	30	24	18
9	22½	54	45	40½	33¾	27	20¼
10	25	60	50	45	37½	30	22½
11	27½	66	55	49½	41¼	33	24¾
12	30	72	60	54	45	36	27
13	32½	78	65	58½	48¾	39	29¼
14	35	84	70	63	52½	42	31½
15	37½	90	75	67½	56¼	45	33¾
16	40	96	80	72	60	48	36
17	42½	102	85	76½	63¾	51	38¼
18	45	108	90	81	67½	54	40½
19	47½	114	95	85½	71¼	57	42¾
20	50	120	100	90	75	60	45

See page 63 for complete measurements.

All dimensions for lengths of Radiators are from outside to outside of tapping bosses—no bushings used.

*See page 2.

Gurney



GURNEY-OXFORD QUARTET RADIATOR

Plain Pattern

For Steam and Water

Each Section is 8½ inches wide.

See page 63 for complete measurements.

In ordering, specify what tappings, whether right or left thread; also see directions for ordering radiators, pages 84 and 85.

Gurney

TABLE OF GURNEY-OXFORD QUARTET RADIATOR CAPACITIES

Plain Pattern **Steam or Hot Water**

Size of Radiator No. of Loops Long	Extreme Length of Radiator in Inches	Heating Surface—Feet*				
		42½ in. High, 9⅔ ft. per sec.	38½ in. High, 8 ft. per sec.	32½ in. High 6⅔ ft. per sec.	26½ in. High, 5⅓ ft. per sec.	20½ in. High 4 ft. per sec.
4 x 2	8½	19⅓	16	13⅓	10⅔	8
4 x 3	12½	29	24	20	16	12
4 x 4	16½	38⅔	32	26⅔	21⅓	16
4 x 5	20¾	48⅓	40	33⅓	26⅔	20
4 x 6	24¾	58	48	40	32	24
4 x 7	28¾	67⅔	56	46⅔	37⅓	28
4 x 8	32¾	77⅓	64	53⅓	42⅔	32
4 x 9	37	87	72	60	48	36
4 x 10	41	96⅔	80	66⅔	53⅓	40
4 x 11	45	106⅓	88	73⅓	58⅔	44
4 x 12	49¼	116	96	80	64	48
4 x 13	53¼	125⅔	104	86⅔	69⅓	52
4 x 14	57½	135⅓	112	93⅓	74⅔	56
4 x 15	61½	145	120	100	80	60
4 x 16	65½	154⅔	128	106⅔	85⅓	64
4 x 17	69¾	164⅓	136	113⅓	90⅔	68
4 x 18	73¾	174	144	120	96	72
4 x 19	77¾	183⅔	152	126⅔	101⅓	76
4 x 20	82	193⅓	160	133⅓	106⅔	80

See page 63 for complete measurements.

In ordering, specify what tappings, whether right or left hand thread; also see directions for ordering radiators, pages 84 and 85.

*See page 2.

Gurney

GURNEY-OXFORD FIVE-COLUMN RADIATOR

Steam or Water

Made in Plain Pattern Only.

Width of Section 12¼ inches.

See page 63 for complete measurements.

In ordering, specify what tappings, whether right or left hand thread; also see directions for ordering radiators, pages 84 and 85.

Gurney

GURNEY-OXFORD FIVE-COLUMN RADIATORS

Steam or Water

Made in Plain Pattern Only.

Size of Rad. No. of Loops Long	Extreme Length of Radiator in Inches	Heating Surface—Feet*	
		38 in. High, 10 ft. per sec.	26 in. High, 7 ft. per sec.
5 x 2	6½	20	14
5 x 3	9¾	30	21
5 x 4	13	40	28
5 x 5	16¼	50	35
5 x 6	19½	60	42
5 x 7	22¾	70	49
5 x 8	26	80	56
5 x 9	29¼	90	63
5 x 10	32½	100	70
5 x 11	35¾	110	77
5 x 12	39	120	84
5 x 13	42¼	130	91
5 x 14	45½	140	98
5 x 15	48¾	150	105
5 x 16	52	160	112
5 x 17	55¼	170	119
5 x 18	58½	180	126
5 x 19	61¾	190	133
5 x 20	65	200	140
5 x 21	68¼	210	147
5 x 22	71½	220	154
5 x 23	74¾	230	161
5 x 24	78	240	168
5 x 25	81¼	250	175

See page 63 for complete measurements.

In ordering, specify what tappings, whether right or left hand thread; also see directions for ordering radiators, pages 84 and 85.

*See page 2.

Gurney

Steam
or
Water

Plain
Only

GURNEY WINDOW RADIATOR

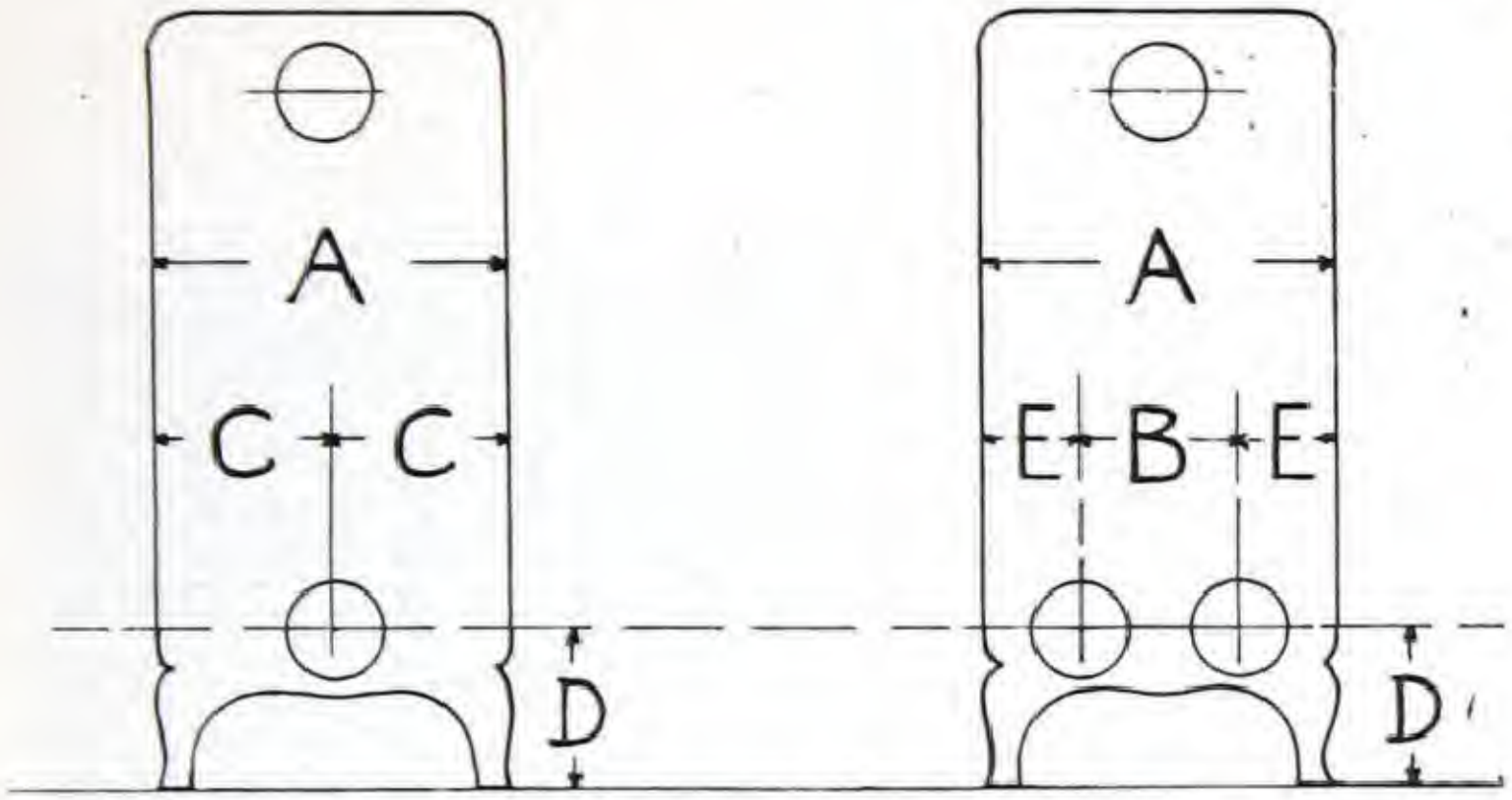
Size of Radiator, No. of Loops Long	Extreme Length of Radiator in inches	Heating Surface—Feet*	
		13½ in. High, 4 ft. per sec.	16½ in. High, 5 ft. per sec
5 x 2	6	8	10
5 x 3	9	12	15
5 x 4	12	16	20
5 x 5	15	20	25
5 x 6	18	24	30
5 x 7	21	28	35
5 x 8	24	32	40
5 x 9	27	36	45
5 x 10	30	40	50
5 x 11	33	44	55
5 x 12	36	48	60
5 x 13	39	52	65
5 x 14	42	56	70
5 x 15	45	60	75
5 x 16	48	64	80
5 x 17	51	68	85
5 x 18	54	72	90
5 x 19	57	76	95
5 x 20	60	80	100

See page 63 for complete measurements.

Width of Radiator, 11½ inches.

In ordering, specify what tappings, whether right or left hand thread; also see directions for ordering radiators, pages 84 and 85.

*See page 2.



DIMENSIONS OF LOOPS AND TAPPING CENTRES

Description	A (ins.)	B (ins.)	C (ins.)	D (ins.)	E (ins.)
Single Column...	$4\frac{1}{2}$	..	$2\frac{1}{4}$	4	..
Two Column.....	$7\frac{1}{4}$	$3\frac{1}{4}$	$3\frac{5}{8}$	$4\frac{1}{2}$	2
Three Column...	9	$3\frac{1}{4}$	$4\frac{1}{2}$	$4\frac{1}{2}$	$2\frac{7}{8}$
Quartet.....	$8\frac{1}{2}$	$3\frac{3}{8}$	$4\frac{1}{4}$	4	$2\frac{1}{2}$
Five Column.....	$12\frac{1}{4}$	$3\frac{1}{4}$	$6\frac{1}{8}$	4	$4\frac{1}{2}$
Window.....	$11\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{3}{4}$	3	$4\frac{1}{8}$

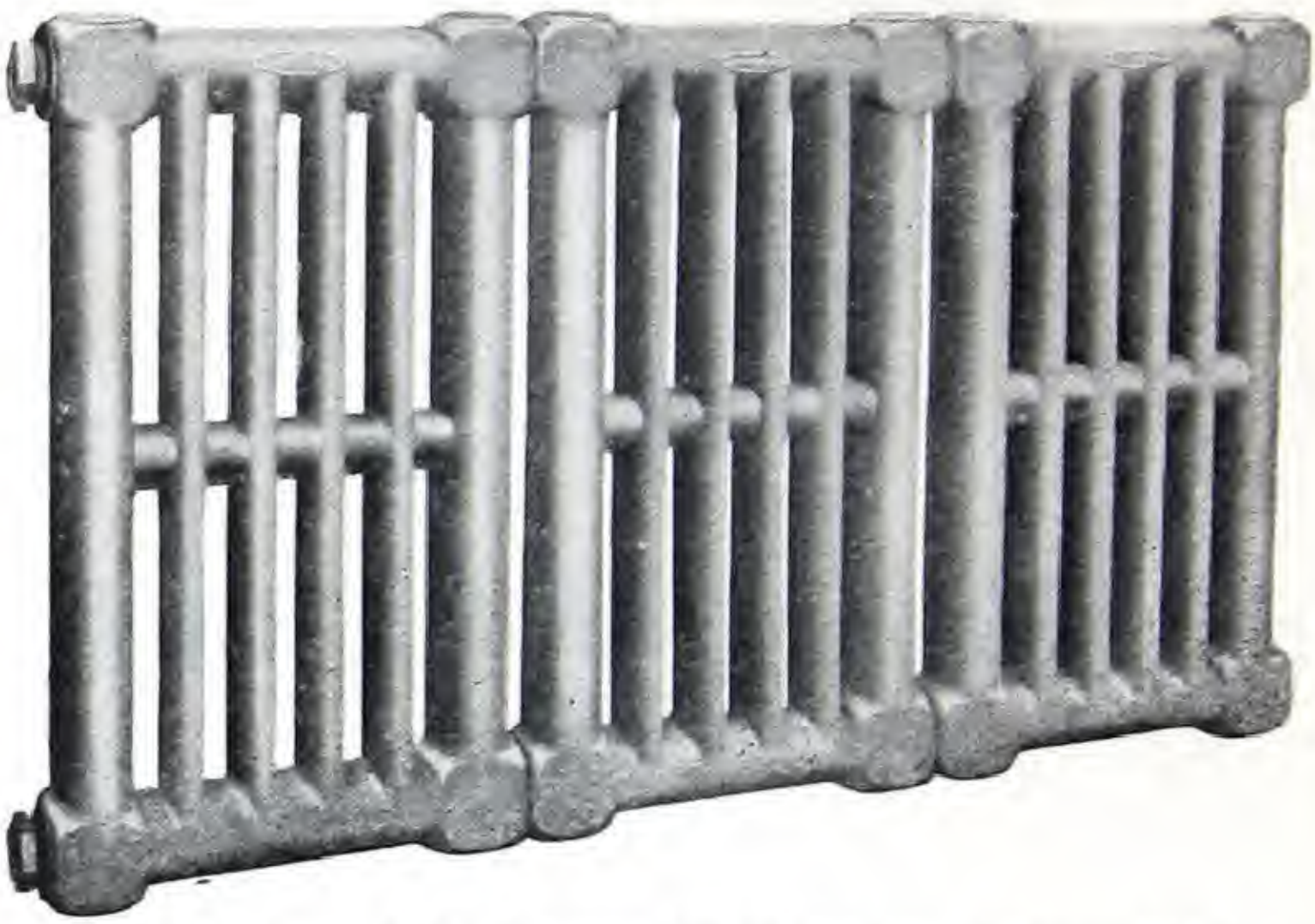
Note.—Tappings are solid—no allowance to be made for bushings.

Floor to Centre of Top Opening in Inches

Ht. of Radiator	18	20	22	23	26	32	38	45
Single Column.	....	....	....	....	....	....	$35\frac{1}{2}$	....
Two Column...	....	18	....	21	24	30	36	43
Three Column.	16	....	20	....	24	30	36	43
Five Column...	....	....	....	....	$24\frac{3}{16}$	....	$36\frac{3}{16}$	....

Ht. of Radiator	$13\frac{1}{2}$	$16\frac{1}{2}$	$20\frac{1}{2}$	$26\frac{1}{2}$	$32\frac{1}{2}$	$38\frac{1}{2}$	$42\frac{1}{2}$
Window.....	$11\frac{7}{8}$	$14\frac{7}{8}$	....	....	....	....	....
Quartet.....	....	....	$18\frac{3}{4}$	$24\frac{3}{4}$	$30\frac{1}{2}$	$36\frac{3}{4}$	$40\frac{3}{4}$

Gurney

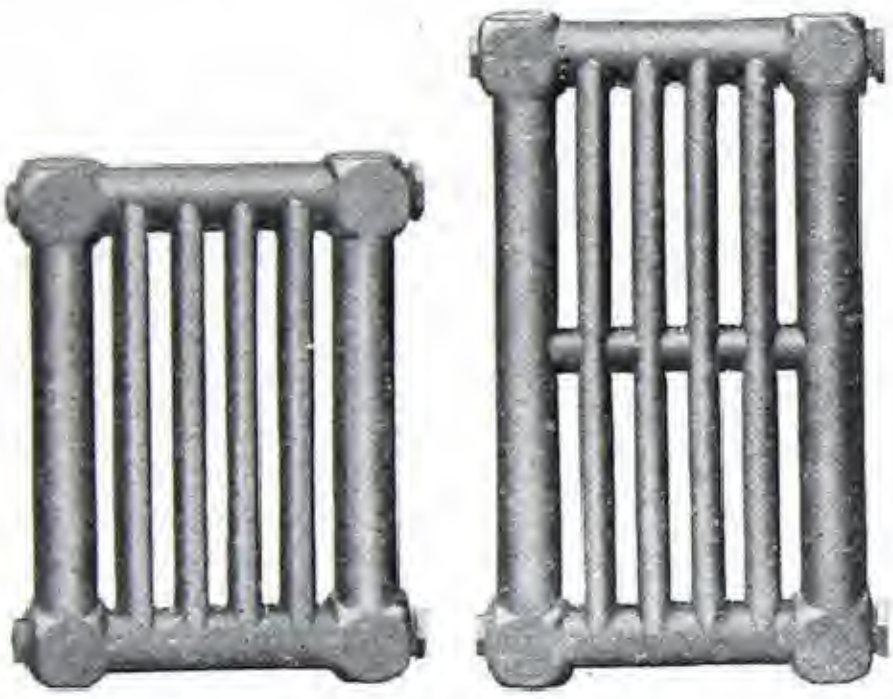


Illustrating 9 ft. Loop Vertically Assembled.

GURNEY WALL RADIATORS

These may be vertically or horizontally assembled. For any apartment where wall space is not as valuable as floor space, these radiators are highly recommended. They may be grouped together in a great many different ways, between windows, or on the ceiling, in one, two or three tiers. They are particularly adaptable for factory, warehouse and school work, where there are no fixtures to go along the wall and where floor space is valuable.

Gurney



7 Ft. Section. 9 Ft. Section.

GURNEY WALL RADIATORS

For Steam or Water.

These radiators are especially adapted for heating narrow hallways, bathrooms, vessels with steam heating equipment, churches, factories and warehouses.

They are assembled in various ways, as illustrated on pages 68 and 69, or any other arrangement. desired.

GURNEY WALL RADIATOR.

Dimensions, Capacities, Etc.

The Seven Foot Loop—Horizontally Connected.

3 inch wide.

No. of Sections	Height, Inches	Length, Inches	*Feet of Heating Surface
1	14	19⅛	7
2	14	38¼	14
3	14	57⅜	21
4	14	76½	28
5	14	95⅝	35
6	14	114¾	42
7	14	133⅞	49

The Seven Foot Loop—Vertically Connected.

3 inch wide.

No. of Sections	Height, Inches	Length, Inches	*Feet of Heating Surface
1	19⅛	14	7
2	19⅛	28	14
3	19⅛	42	21
4	19⅛	56	28
5	19⅛	70	35
6	19⅛	84	42
7	19⅛	98	49

*See page 2.

TAPPINGS FROM CENTRE TO CENTRE.

7 ft. section, horizontal.....10⅜ inches
7 ft. section, vertical.....16 inches
9 ft. section, horizontal.....10⅜ inches
9 ft. section, vertical.....21 inches

GURNEY WALL RADIATOR—Continued

The Nine Foot Loop—Horizontally Connected

3 inches wide.

No. of Sections	Height, Inches	Length, Inches	*Feet of Heating Surface
1	14	$24\frac{1}{8}$	9
2	14	$48\frac{1}{4}$	18
3	14	$72\frac{3}{8}$	27
4	14	$96\frac{1}{2}$	36
5	14	$120\frac{5}{8}$	45
6	14	$144\frac{3}{4}$	54

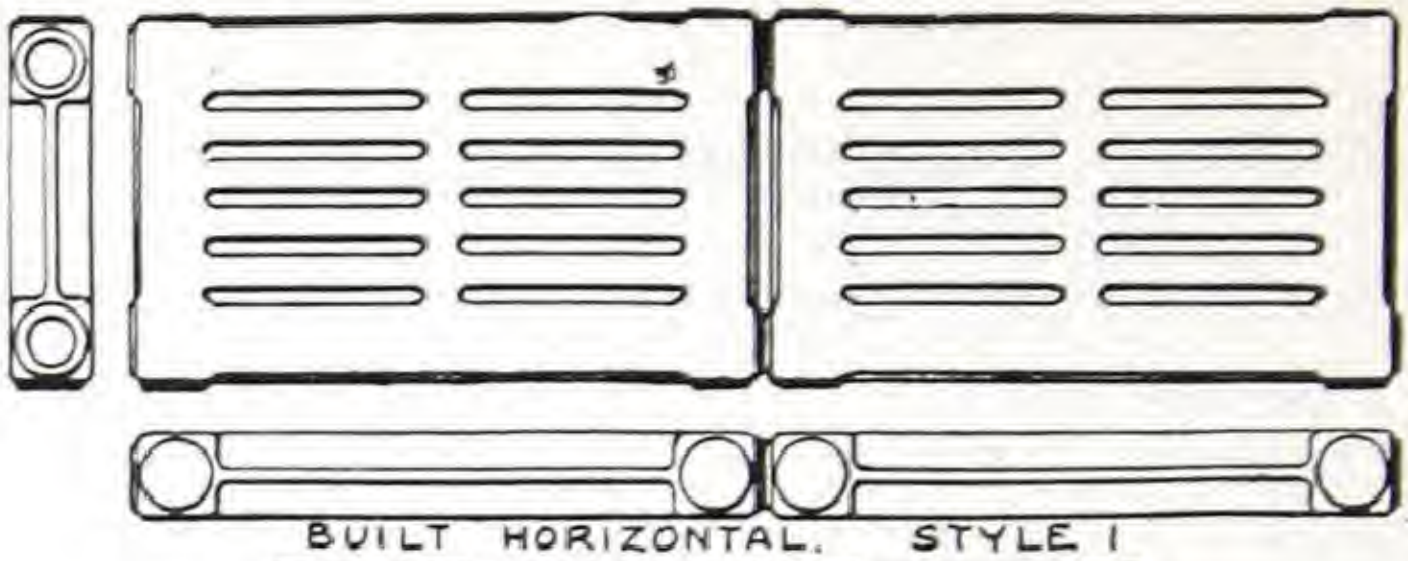
The Nine Foot Loop—Vertically Connected.

3 inches wide.

No. of Sections	Height, Inches	Length, Inches	*Feet of Heating Surface
1	$24\frac{1}{8}$	14	9
2	$24\frac{1}{8}$	28	18
3	$24\frac{1}{8}$	42	27
4	$24\frac{1}{8}$	56	36
5	$24\frac{1}{8}$	70	45
6	$24\frac{1}{8}$	84	54
7	$24\frac{1}{8}$	98	63
8	$24\frac{1}{8}$	112	72

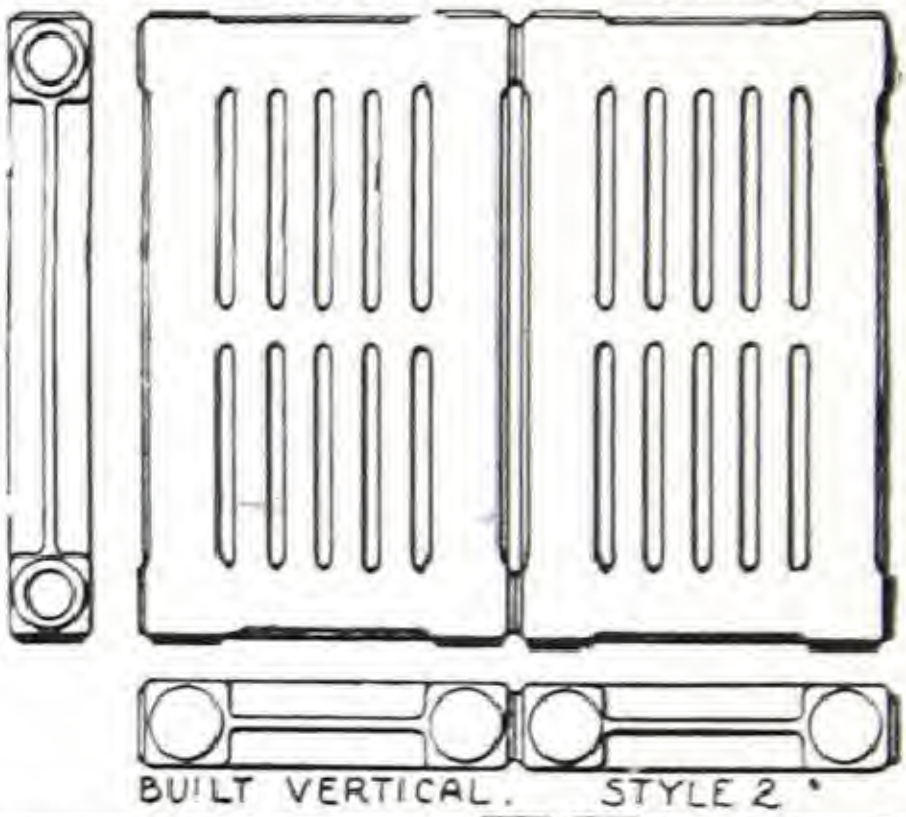
*See page 2.

Gurney



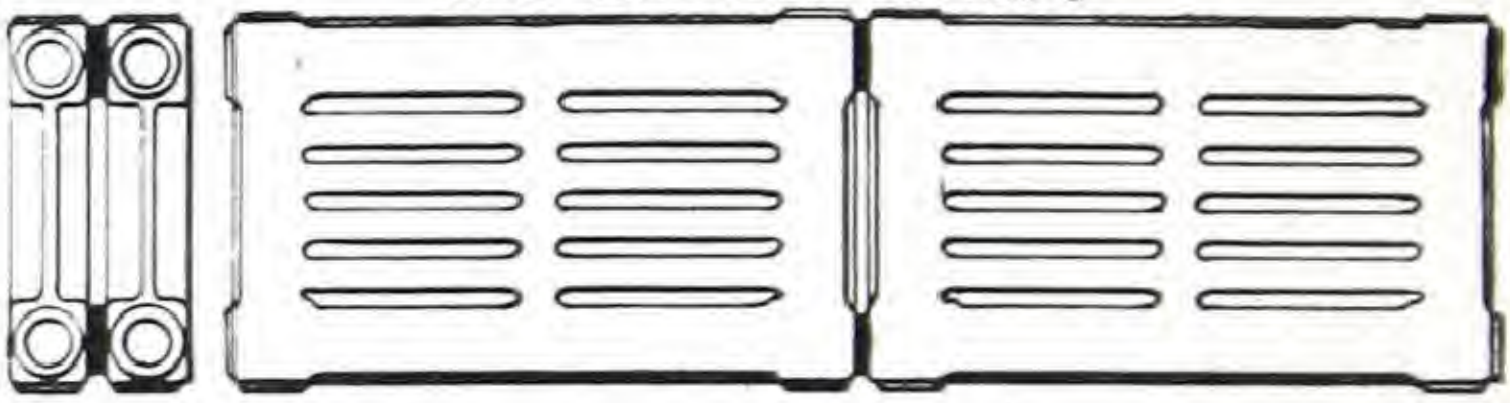
BUILT HORIZONTAL. STYLE 1

Gurney Wall Radiator

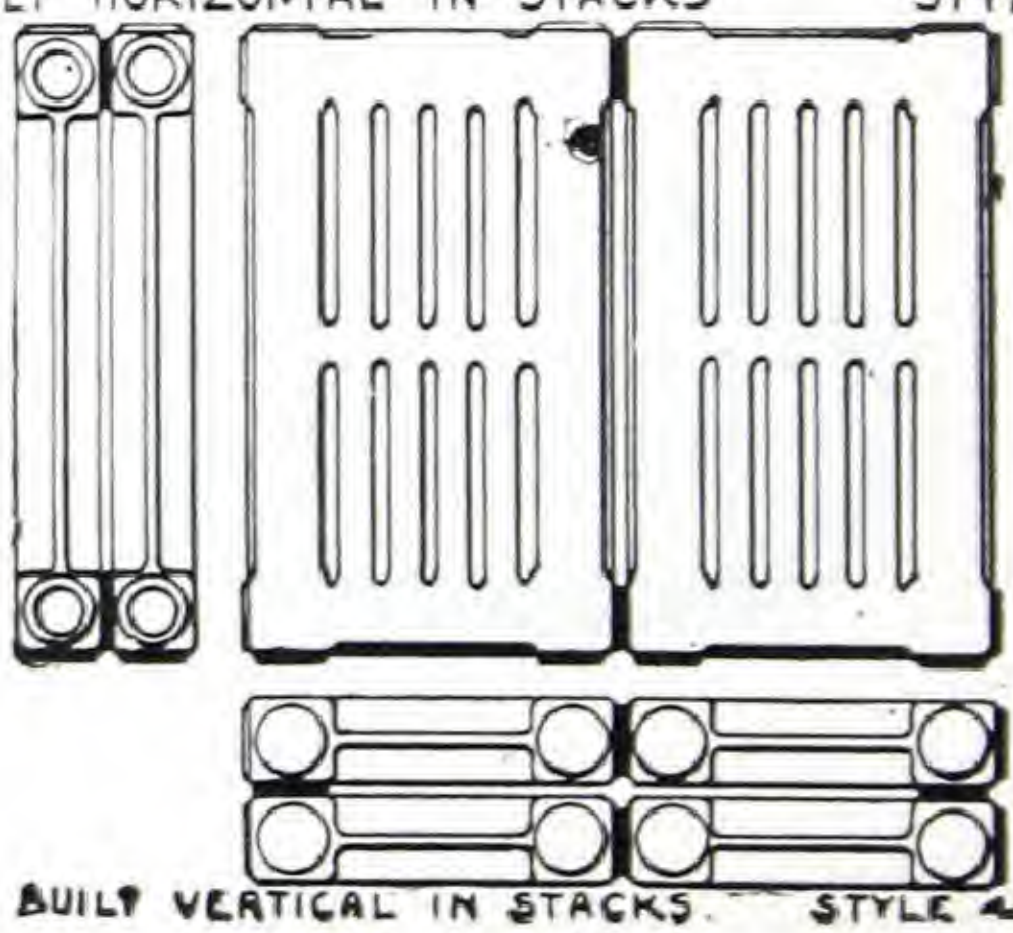


Assembled Sections.

BUILT VERTICAL. STYLE 2



BUILT HORIZONTAL IN STACKS STYLE 3.

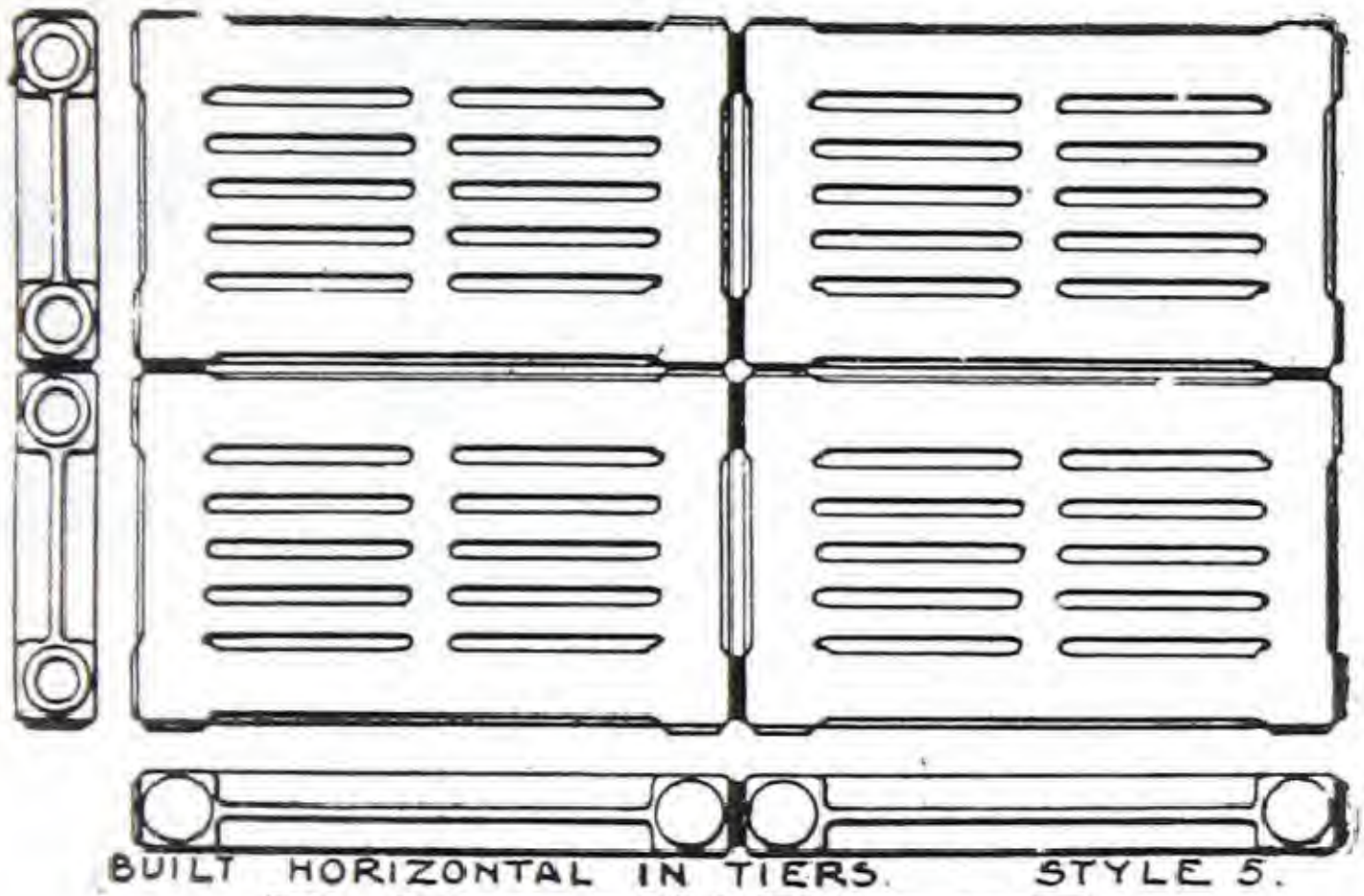


BUILT VERTICAL IN STACKS. STYLE 4.

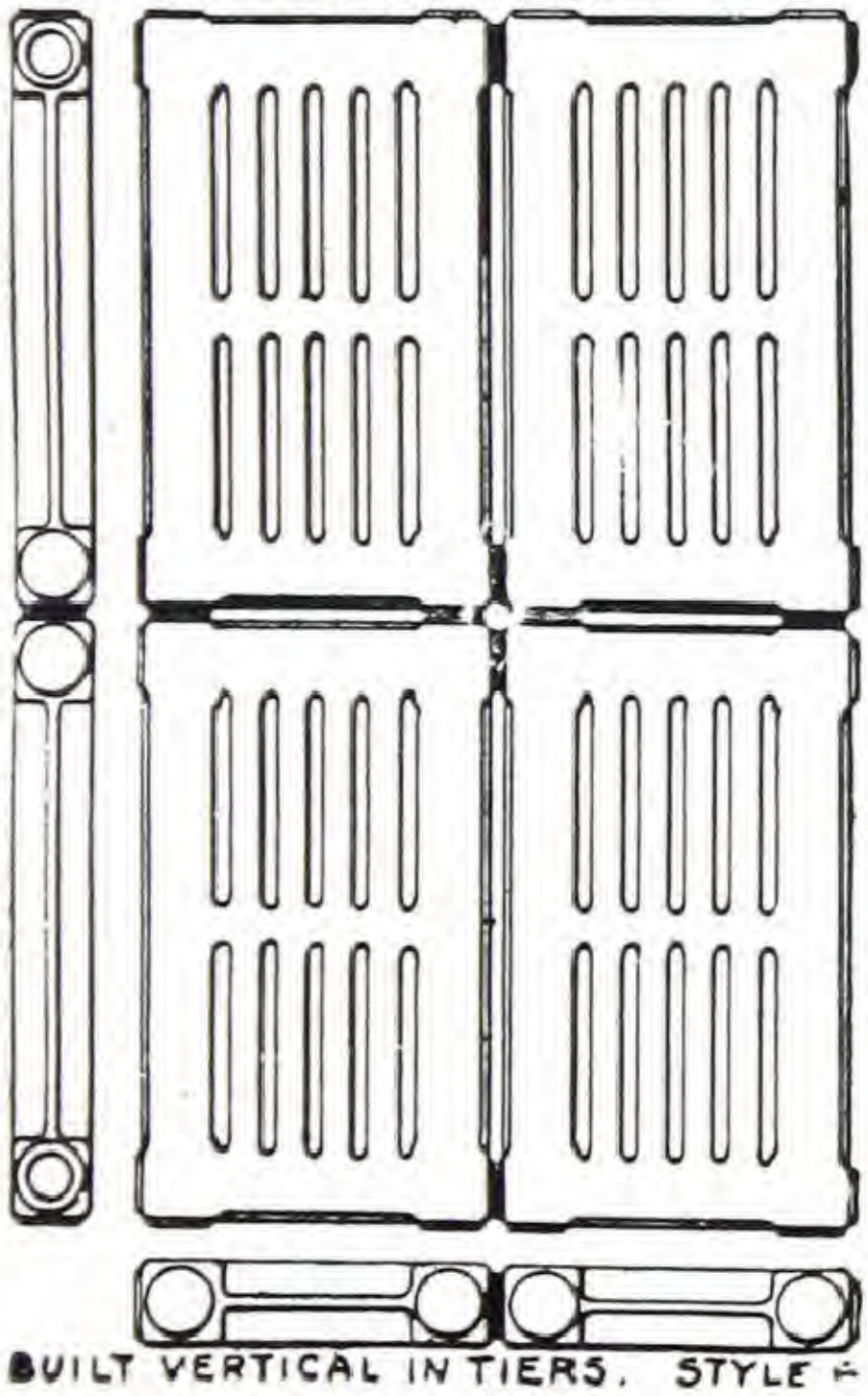
Gurney

GURNEY WALL RADIATOR.

Assembled Sections.



BUILT HORIZONTAL IN TIERS. STYLE 5.



BUILT VERTICAL IN TIERS. STYLE 4

Gurney

WALL RADIATOR BRACKETS, ETC.

No. A. 4.

No. A. 1. No. A. 2. No. D. 3 Group No. A. 5 No. G. 6.

The above illustrates the brackets most generally used. Unless otherwise specified, the brackets we ship with wall radiators consist of No. A. 1, which is for the bottom of the radiator, and a small button (not illustrated), which holds the section in position by means of a screw into the studding of the wall. The screw is not supplied with bracket. All brackets are extra.

A. 1. Lower Bracket for 7 and 9 foot sections.
A. 1½. Lower Bracket for School Loop.
A. 2. Lower Bracket, used where it is desirable to attach the bracket to the base board under the radiator section, thus allowing the bracket to be somewhat visible.
D. 3. Wall Radiator Foot, used to support a wall section from the floor.
A. 4. This is a Plate which is tapped for ¼ in. stove bolt, and is to be used in connection with the small button or spud (not illustrated), where it is not desirable to run a bolt or screw directly into the wall.
A. 5. (3 pieces) This is a Ceiling Bracket, consisting of a cast plate 3½ in. diameter, screwed to the ceiling by four screws, not furnished by us, and attached through the section by a threaded rod through the plate in the lower part of the illustration, which supports the radiator section, and is held by nut illustrated.
G. 6 Adjustable Pedestal, consisting of top casting or support, and round plate for floor. Both castings tapped for pipe. Pipe not furnished by us unless ordered specially.

Gurney

HIGH LEG RADIATORS

Made in all styles and heights

ADJUSTABLE FOOT-UPS.

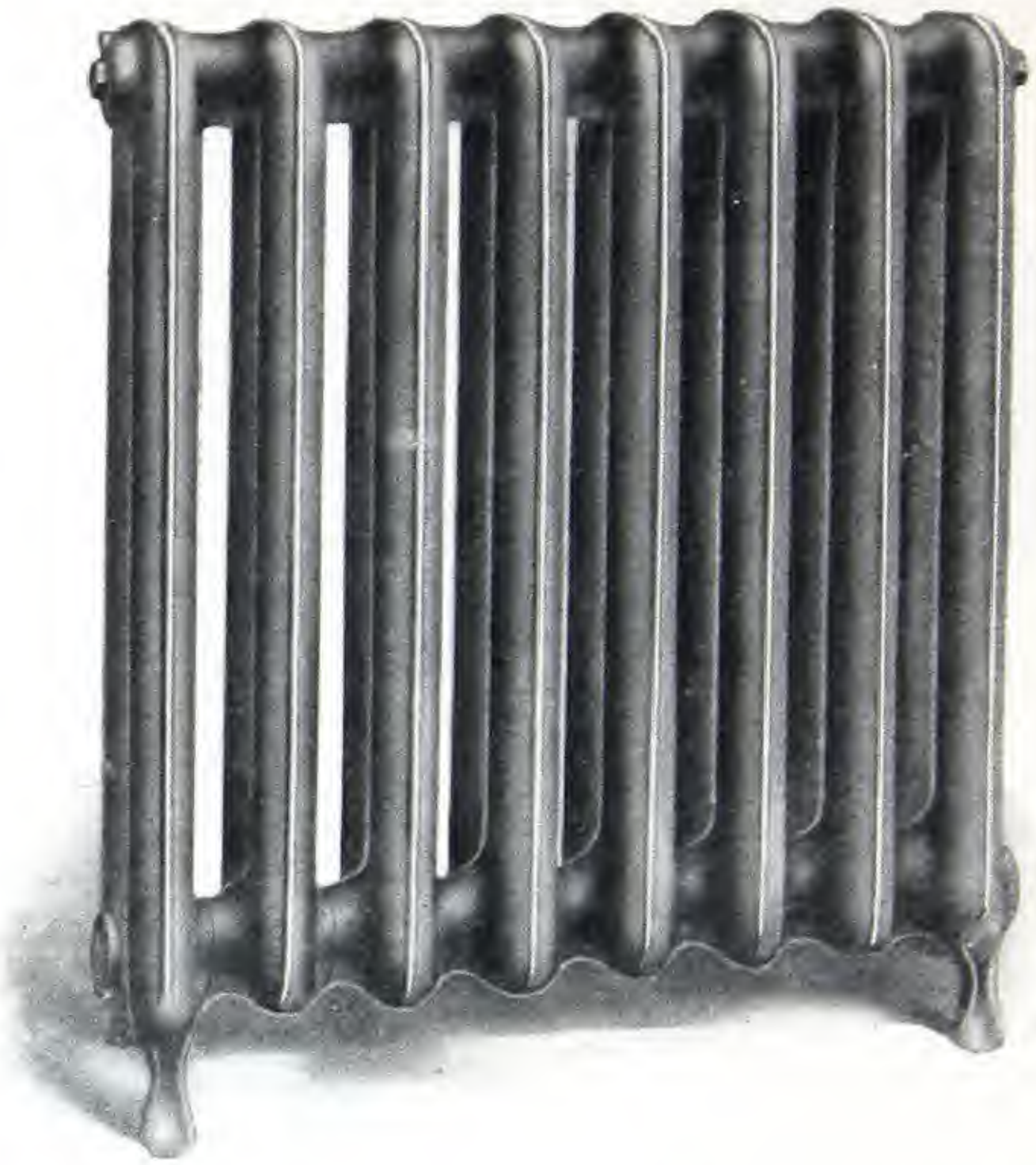
Gurney adjustable foot rests insure accurate adjustment of radiator in place of usual slant when boards are used or floors are out of level.

They are cheaper than boards, and are guaranteed to make the work "look right" regardless of local conditions. Made of cast iron without finish. To finish, paint with same bronze as radiator.

Dimensions.

Number	Height Open	Height Closed
1	$1\frac{1}{4}$ inch	$\frac{7}{8}$ inch
2	$1\frac{3}{4}$ inch	$1\frac{1}{4}$ inch
3	$2\frac{1}{4}$ inch	$1\frac{3}{8}$ inch

Gurney



GURNEY HOSPITAL RADIATOR

For Steam or Hot Water.

Screw Nipple Only.

This Radiator represents most advanced practice in hospital equipment, being so designed that any lodgement of dust is readily cleaned away, so that germs have little or no opportunity to multiply.

Allow ½ inch for each plug or bushing in estimating length of radiator.

Gurney

TWO-COLUMN HOSPITAL RADIATORS

For Steam and Water

No. of Sections	*Length 3-in. per Sec.	HEATING SURFACE—FEET*					
		45-in. Height 5 feet* per Sec.	38-in. Height 4 feet* per Sec.	32-in. Height 3½ feet* per Sec.	26-in. Height 2⅔ feet* per Sec.	23-in. Height 2⅓ feet* per Sec.	20-in. Height 2 feet* per Sec.
2	7	10	8	6⅔	5⅓	4⅔	4
3	10½	15	12	10	8	7	6
4	14	20	16	13⅓	10⅔	9⅓	8
5	17½	25	20	16⅔	13⅓	11⅔	10
6	21	30	24	20	16	14	12
7	24½	35	28	23⅓	18⅔	16⅓	14
8	28	40	32	26⅔	21⅓	18⅔	16
9	31½	45	36	30	24	21	18
10	35	50	40	33⅓	26⅔	23⅓	20
11	38½	55	44	36⅔	29⅓	25⅔	22
12	42	60	48	40	32	28	24
13	45½	65	52	43⅓	34⅔	30⅓	26
14	49	70	56	46⅔	37⅓	32⅔	28
15	52½	75	60	50	40	35	30
16	56	80	64	53⅓	42⅔	37⅓	32
17	59½	85	68	56⅔	45⅓	39⅔	34
18	63	90	72	60	48	42	36
19	66½	95	76	63⅓	50⅔	44⅓	38
20	70	100	80	66⅔	53⅓	46⅔	40
21	73½	105	84	70	56	49	42
22	77	110	88	73⅓	58⅔	51⅓	44
23	80½	115	92	76⅔	61⅓	53⅔	46
24	84	120	96	80	64	56	48
25	87½	125	100	83⅓	66⅔	58⅓	50

If three column hospital Radiator is required, use footage tables on page 57. Lengths per section are as in column two of above table.

*See page 2.

Gurney

RADIATOR SPECIALTIES

Extra for Curves and Angles, see Price List.

CURVED RADIATOR

Steam or Water

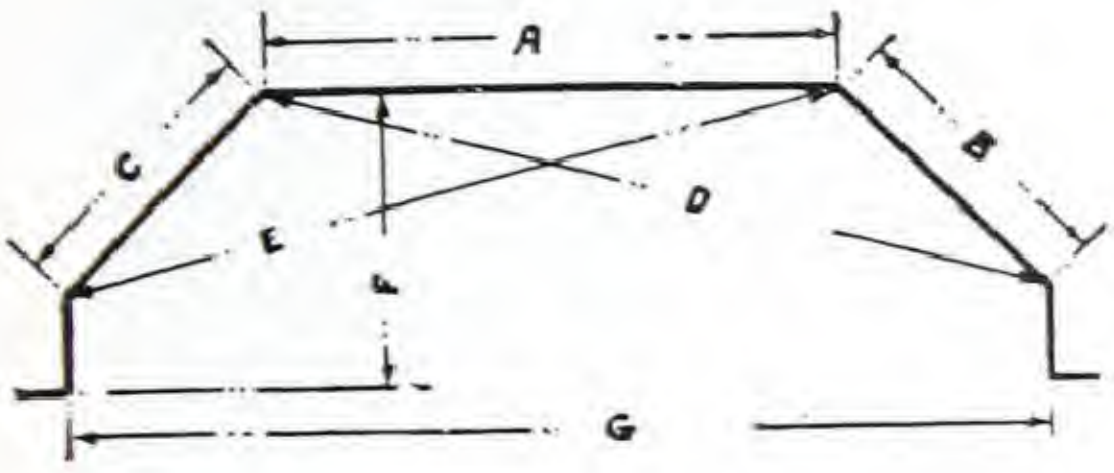
ANGLE RADIATOR

Steam or Water

For Instructions For Ordering, see pages 75, 84 and 85.

Gurney

HOW TO ORDER ANGLE RADIATORS.



The above diagram shows the measurements necessary to ensure a perfect angle radiator. In ordering be careful to give exact measurement for each dimension indicated by the letters A, B, C, D, E, F, G.

It is preferable that you furnish an exact templet, but where it is not convenient a diagram as above will be required.

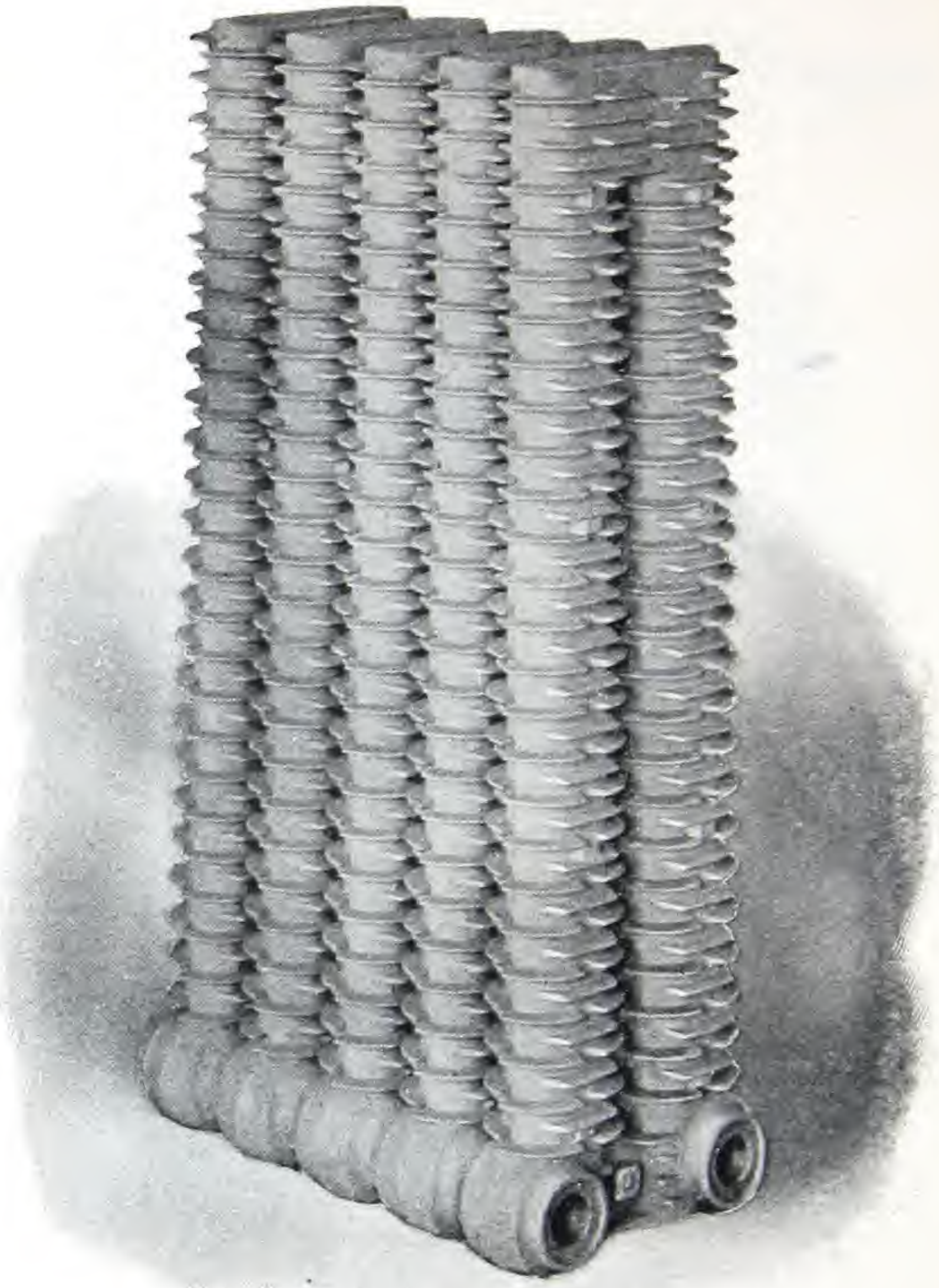
Be sure to indicate how the tappings are to be made, their size, and where located.

For twin connections state whether they are to be on the right hand or left hand end as you face the radiator.

For curved radiators a templet made of wood should be furnished.

For corner radiators send an exact diagram or a templet and state how many sections are to be on each arm, and how each arm is to be tapped.

Gurney



GURNEY CLIMAX

Ventilating or Indirect Radiator.

Push Nipple Construction.

GURNEY CLIMAX INDIRECT RADIATORS.

For Heating and Ventilating by Steam or Hot Water.

Table of Capacities.

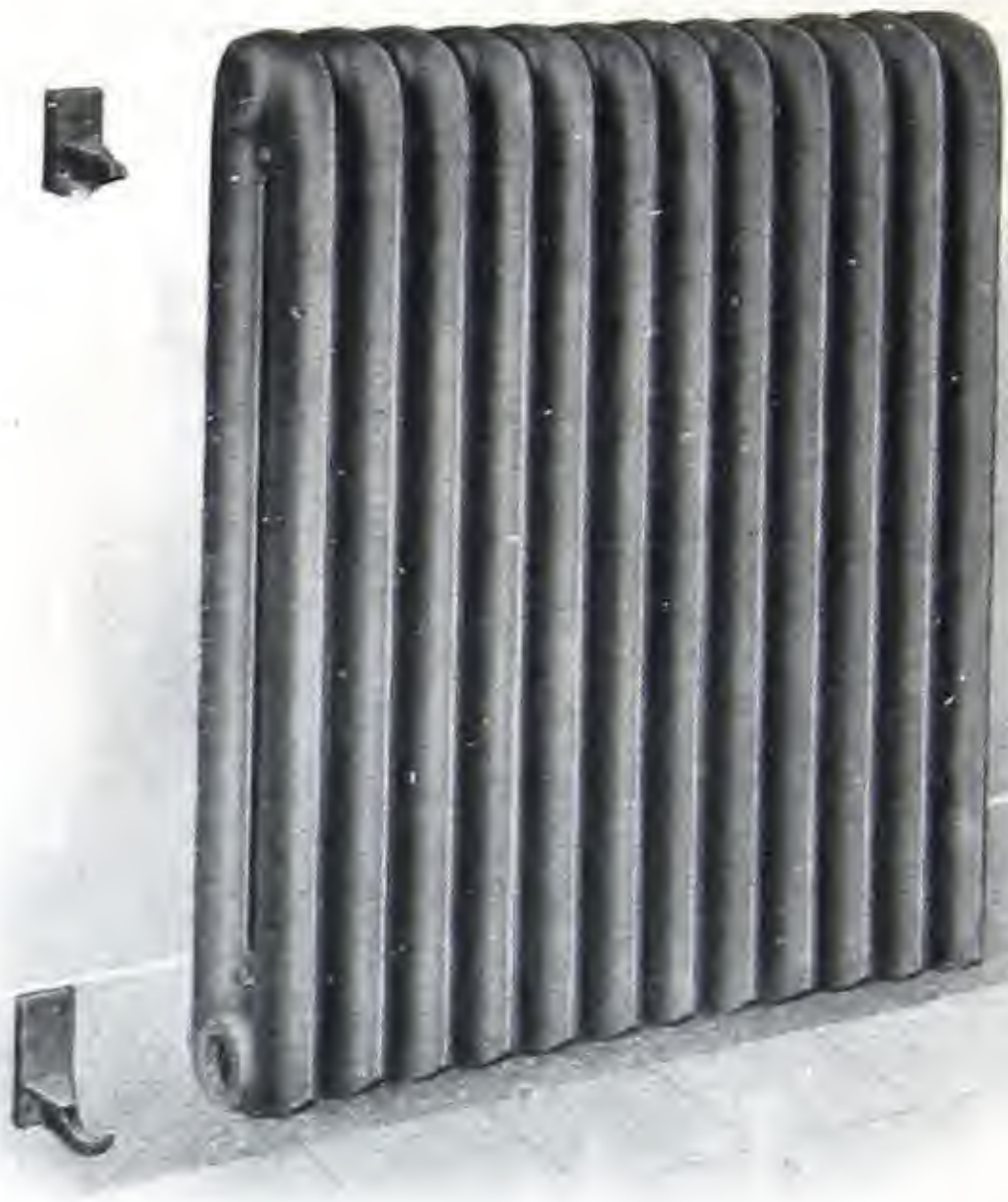
No. of Sections in Stack	*Feet of Heating Surface	Area Cold Air Supply, Square Inches	Area Warm Air Flue, Square Inches	Size for Hot Air Flue, Inches	Size of Register, Inches
2	26	54	72	8 x 8	9 x 12
3	39	72	96	8 x 12	10 x 14
4	52	90	120	8 x 12	12 x 15
5	65	108	144	12 x 12	12 x 19
6	78	126	168	12 x 12	14 x 22
7	91	144	192	12 x 16	14 x 24
8	104	162	226	12 x 16	16 x 20
9	117	180	240	12 x 20	16 x 24
10	130	198	264	12 x 20	20 x 20
11	143	216	288	12 x 24	20 x 24
12	156	234	312	12 x 24	20 x 24

Length 36 ins.; Height 11ins.; Width 3½ ins. per section.

In ordering loose indirect radiator, specify the exact number of sections in each stack, so that the proper number of end sections will be supplied, also whether for water or steam, size and location of tappings, and whether tapped left or right hand.

*See page 2.

Gurney



Two Column Plain Radiator with Concealed Brackets.

LEGLESS RADIATORS

Made in 1, 2 and 3 Columns. (See lists of these for size, capacities, etc.).

This type of Radiator is very desirable for use in narrow corridors, or in rooms where floor space is limited. Illustration shows type of brackets furnished, also Radiator supported on brackets.

In ordering this type of Radiator simply state "Radiator without legs to be used in connection with concealed brackets." Unless brackets are specified on order Radiators will be shipped without same. The same data regarding heating surface, connections, and tapping applying to Radiators with legs applies to Radiators without legs.

Gurney

TAPPING LIST OF RADIATORS.

One-Pipe Gravity Steam

One-Pipe Steam Radiators Containing	Inches
25 square feet and under	1
26 to **60** square feet	1 1/4
61 to **100** square feet	1 1/2
Over **100** square feet	2

Note—One-pipe Steam Radiators are tapped **Left Hand** unless otherwise ordered.

Two-Pipe Gravity Steam

Two-Pipe Steam Radiators Containing—	
50 square feet and under	1 x 3/4
51 to **95** square feet	1 1/4 x 1
Over **95** square feet	1 1/2 x 1 1/4

Note—Two-pipe Steam Radiators are tapped **Right Hand** unless otherwise ordered.

All Gurney Steam Radiators will be tapped as above. When any special tappings are desired they should be plainly stated on orders.

Gurney

TAPPING LIST OF RADIATORS.

DUNHAM RETURN HEATING SYSTEM

Hot Water Type of Radiation—Top Inlet

HEATING SURFACE	Feed	Return
1 to **40** feet	$\frac{1}{2}$"	$\frac{1}{2}$"
41 to **100** feet	$\frac{3}{4}$"	$\frac{1}{2}$"
101 to **180** feet	1"	$\frac{1}{2}$"
181 to **300** feet	$1\frac{1}{4}$"	$\frac{1}{2}$"

Tapped top and bottom opposite ends for flow and return. Flow right hand (unless otherwise specified), and return right hand eccentric. No air vent tapping.

DUNHAM RETURN HEATING AND VACUUM SYSTEMS

Steam Type of Radiation—Bottom Inlet

HEATING SURFACE	Feed	Return
1 to **25** feet	$\frac{1}{2}$"	$\frac{1}{2}$"
26 to **80** feet	$\frac{3}{4}$"	$\frac{1}{2}$"
81 to **150** feet	1"	$\frac{1}{2}$"
151 to **250** feet	$1\frac{1}{4}$"	$\frac{1}{2}$"
251 to **350** feet	$1\frac{1}{2}$"	$\frac{1}{2}$"

Tapped bottom, opposite ends for flow and return. Flow right hand (unless otherwise specified), and return right hand eccentric. No air vent tapping.

Gurney

TAPPING LIST OF RADIATORS.

WEBSTER MODULATION SYSTEM

Hot Water Type of Radiation—Top Inlet

Heating Surface	Feed	Return
1 to **50** feet	$\frac{3}{4}$ "	$\frac{1}{2}$ "
51 to **100** feet	1 "	$\frac{1}{2}$ "
101 to **170** feet	$1\frac{1}{4}$ "	$\frac{1}{2}$ "
171 to **270** feet	$1\frac{1}{2}$ "	$\frac{3}{4}$ "

Tapped top and bottom, opposite ends right hand. Return eccentric. No air vent tapping.

WEBSTER VACUUM SYSTEM

Steam Type of Radiation—Bottom Inlet

Heating Surface	Feed	Return
1 to **75** feet	$\frac{3}{4}$ "	$\frac{1}{2}$ "
76 to **150** feet	1 "	$\frac{1}{2}$ "
151 to **200** feet	$1\frac{1}{4}$ "	$\frac{1}{2}$ "
201 to **250** feet	$1\frac{1}{4}$ "	$\frac{3}{4}$ "
251 to **400** feet	$1\frac{1}{2}$ "	$\frac{3}{4}$ "

Tapped bottom opposite ends for flow and return. Flow right hand (unless otherwise specified), and return right hand eccentric. No air vent tapping.

Gurney

TAPPING LIST OF RADIATORS

Hot Water and Special Systems.

GRAVITY HOT WATER.

Single or Twin Connections. Standard Tappings.

Hot Water Radiators Containing—	Inches
48 feet and under	1 x 1
49 to 100 feet	1¼ x 1¼
Over 100 feet	1½ x 1½

All Hot Water Radiators tapped twin connections left hand thread unless otherwise ordered.

All tappings for opposite end connection at bottom right hand thread unless otherwise ordered.

In ordering special tappings they should be clearly specified.

Wall Radiators for Hot Water are tapped top and bottom, same end left hand unless otherwise specified.

HONEYWELL HOT WATER GENERATOR SYSTEM.

Ground or First Floor.

Up to 30 feet	½ inch
From 31 to 60 feet	¾ inch
Over 60 feet	1 inch

Second Floor.

Up to 40 feet	½ inch
From 41 to 100 feet	¾ inch
Over 100 feet	1 inch

Third Floor.

Up to 50 feet	½ inch
From 51 to 125 feet	¾ inch
Over 125 feet	1 inch

In ordering radiators for any pressure or generator system the tapping of each radiator should be specified. System of tapping same as for standard system above except as to size.

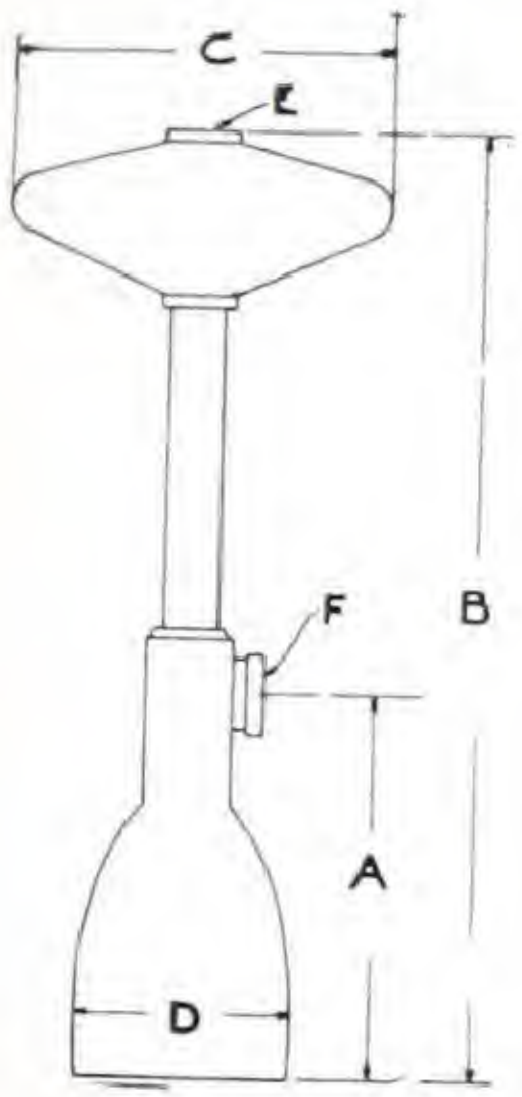
Gurney

HONEYWELL DATA.

Generator Capacities

No. **1**	Carries up to **1,200** sq. ft. of radiation
No. **2**	Carries up to **2,500** sq. ft. of radiation
No. **3**	Carries up to **3,500** sq. ft. of radiation
No. **4**	Carries up to **10,000** sq. ft. of radiation

Larger sizes built to order only.



Roughing-in Dimensions, Inches

Generator	A	B	C	D
No. **1**	$12\frac{1}{2}''$	$28\frac{1}{2}''$	$8\frac{1}{2}''$	$4\frac{1}{2}''$
No. **2**	$12\frac{1}{2}''$	$29\frac{1}{4}''$	$9''$	$5''$
No. **3**	$12''$	$30\frac{1}{2}''$	$12\frac{1}{2}''$	$6''$
No. **4**	$12''$	$30\frac{1}{2}''$	$12\frac{1}{2}''$	$7''$

Generator Tappings

Size	E	F
1	$\frac{3}{4}''$	$\frac{3}{4}''$
2	$1''$	$1''$
3	$1\frac{1}{4}''$	$1\frac{1}{4}''$
4	$1\frac{1}{4}''$	$1\frac{1}{4}''$

Area of Pipes and Valves

$\frac{1}{2}''$ .20 sq. in.	**2**$\frac{1}{2}''$ 4.90 sq. in.	**6**$''$ 28.27 sq. in.
$\frac{3}{4}''$ .44. sq. in.	**3**$''$ 7.06 sq. in.	**7**$''$ 38.48 sq. in.
1$''$ .78 sq. in.	**3**$\frac{1}{2}''$ 9.62 sq. in.	**8**$''$ 50.26 sq. in.
1$\frac{1}{4}''$ 1.22 sq. in.	**4**$''$ 12.56 sq. in.	**9**$''$ 63.61 sq. in.
1$\frac{1}{2}''$ 1.76 sq. in.	**4**$\frac{1}{2}''$ 15.90 sq. in.	**10**$''$ 78.54 sq. in.
2$''$ 3.14 sq. in.	**5**$''$ 19.63 sq. in.	**12**$''$ 113.098 sq. in.

Gurney

DIRECTIONS FOR ORDERING RADIATORS.

GENERAL

1—It is desirable to specify name of job.

2—In all correspondence referring to orders give date and order number shown on our "acknowledgment of order," and your order number if possible.

3—Give exact routing for shipment, and state when wanted.

STANDARD RADIATION

1—State whether 2, 3, 4, or 5 bar wide or single column.

2—Give number of sections in each radiator.

3—State height of radiator.

4—Give catalogue name of radiator.

5—State whether for Hot Water or Steam.

6—If for hot water state whether twin or opposite end connection.

7—If for steam state whether one or two-pipe system. If required for any special system give name of same.

8—Specify exact tappings. State whether right or left hand thread. See tapping list on pages 79-82.

9—In ordering curved or angle radiators, see page 78.

10—In ordering "indirect radiators" state exact tapping for flow, return, and air vent. Sections are shipped loose unless otherwise ordered. Be sure to state how many stacks the sections are to be built up in so as to indicate the required number of end sections.

11—It is customary to divide long radiators in shipping, to avoid straining or breaking while handling or in transit. State if any special division is preferable.

12—It is a general custom to designate a radiator thus: 1—3 x 9 x 38 "Beaver," plain, H. W., Twin L. H. This means one radiator, three columns wide, 9 loops long, 38 inches high, "Beaver," plain pattern, hot water type, tapped twin left hand.

WALL RADIATORS

1—State whether 5, 7, or 9 ft. sections are required.

2—State number of sections in each radiator; also whether they are to be assembled vertically or horizontally, and give style of assembling as shown on pages 68 and 69.

3—State whether tappings are to be right or left hand, and location of tappings, and whether hot water or steam.

4—If required for any special system give name of same.

Gurney

REPAIRS FOR RADIATORS

1—Items No. 1, 3, 4, 5, 6 and 7 of instructions for ordering Standard Radiators apply always in ordering loops or sections for repairs.

2—State whether they are push nipple or screw nipple radiators.

3—If catalogue name is unknown, note carefully any marks of trade marks cast in the end loops such as, "Beaver," "Duet," "Tremont." or any number, etc.

4—State whether hot water or steam, and if steam what kind of system, sometimes hot water style radiators are used for steam. If so, note it on your order.

5—State whether plain or ornamental.

6—In ordering end sections state whether feed, return, or blank end sections are required. Give size and location of tappings, and state whether right or left hand thread.
"Feed end," to indicate feed end section, for one-pipe and two-pipe steam and twin hot water radiators.
"Return end," to indicate section connected to return of two-pipe steam system or opposite end hot water connection.
"Blank end," to indicate section at other end from connection in single pipe steam or twin hot water.

7—If you are replacing any of the intermediate sections between the "ends" but having no feet specify "inside sections."

8—If you are replacing an "inside section" having feet or legs, specify "centre leg section."

9—In ordering repair for wall radiators state whether vertical or horizontal, size and style of tappings, and whether feed, vent, or centre section is required, and whether for hot water or steam.

Gurney

DIRECTIONS FOR ORDERING REPAIR PARTS FOR ROUND BOILERS

1—Be sure that the number is noted correctly and that you add any letters which may be before or after the number on the front.

2—When ordering sections, number them 1, 2, 3, etc., commencing with the first section over the fire-pot.

3—When ordering grate bars or parts for the base, note whether there is a number or letter on the base, and mention that in your order, in addition to the number on the fire door.

4—In ordering grates, specify clearly which grate bar is required, such as "second," numbering from left side when facing boiler. Also state clearly whether it is a shaking bar or not.

5—If the boiler has a single number on the fire door, such as No. 5, without any letter following, be sure to note whether the grates shake from the front or the side of the boiler, and if the latter, and you want grate bars, specify which one, numbering from the front bar.

DIRECTIONS FOR ORDERING REPAIR PARTS FOR SQUARE BOILERS

Note carefully the name and number on the boiler, and in ordering sections state clearly which section, numbering from the front; also, if intermediate section, mention whether it is tapped or plain. When ordering grates which are in two sections, specify whether right or left.

RADIATOR VALVES

SIZES	½ inch	¾ inch	1 inch	1¼ inch	1½ inch	2 inch
N. P. W. W. Angle Rad., Jenkins Disc, without Union	$2.40	$2.90	$3.60	$4.90	$6.65	$10.90
" " " " " " with "	3.15	3.90	4.70	6.25	8.15	13.00
" " Globe, Jenkins Disc, without Union	2.40	2.90	3.60	4.90	6.65	10.90
" " " " " with "	3.15	3.90	4.70	6.25	8.15	13.00
Quick Opening, N.P.W.W. Angle, with Union	2.40	2.85	3.65	5.05	7.10	10.85
" " " " " without "	1.65	1.95	2.65	3.70	5.00	7.75
Q.O. N.P.W.W. Straightway, with Union	....	....	4.70	6.35	9.10	13.95
" " " " without "	....	....	3.70	5.00	7.10	10.85
Union Ells for Water Radiators, N.P.R.H.	1.75	2.00	2.50	3.20	4.00	7.00
Gate Valves, W.W.N.P., without Union	2.40	3.00	3.85	5.00	6.60	9.65
" " " with "	3.65	4.25	5.20	6.60	9.00	12.80

AIR VALVES

HOT WATER	Per doz.
Air Vents, N.P. Wood Wheel	$2.50
Air Vents, N.P., Keyed	4.50
Keys, extra	1.00
Govt. Pattern, Keyed, ⅛ in.	12.00
Govt. Pattern, Keyed, ¼ in.	15.00
Keys, extra	6.00

STEAM	Per doz.
Gurney Oxford Automatic	$12.00
No. 1 Hoffman	27.00

IRON BODY VALVES

SIZES	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	6 in.	7 in.	8 in.	10 in.	12 in.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Globe and Angle Valves, with Yoke, Scd.....each	.....	.....	7.00	9.00	12.50	15.25	19.00	24.00	27.00	37.50	63.00	72.00	114.00	170.00
Globe and Angle Valves, with Yoke, Flgd.....each	.....	.....	8.60	10.75	15.00	18.50	22.50	27.50	31.00	42.00	68.00	77.00	123.00	187.00
Globe and Angle, Jenk. Disc, without Yoke, Scd....each	.....	.....	7.25	11.00	16.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Globe and Angle Jenk. Disc, without Yoke, Flgd....each	.....	.....	8.50	13.00	18.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Globe and Angle Jenk. Disc, with Yoke, Scd.....each	.....	.....	10.00	12.00	16.75	19.50	24.00	32.00	40.00	48.00	80.00	90.00	130.00	185.00
Globe and Angle Jenk, Disc, with Yoke, Flgd.. ....each	.....	.....	11.75	14.00	18.50	21.50	26.00	34.00	42.00	50.00	80.00	90.00	130.00	185.00
Horiz. Swing Check Valves, Scd.....each	.....	.....	.....	12.00	13.50	17.50	20.00	26.00	30.00	36.00	55.00	70.00	110.00	160.00
Horiz. Swing Check Valves, Flgd.....each	.....	.....	.....	14.50	17.00	21.00	24.00	30.00	34.00	41.00	60.00	75.00	115.00	168.00
Gate Valves, Scd.....each	.....	.....	10.00	11.50	14.00	17.00	19.00	24.00	27.50	32.50	45.00	54.00	90.00	125.00
" " Flgd..... "	.....	.....	12.00	13.50	16.50	19.50	23.00	28.00	31.50	36.50	49.00	58.00	95.00	133.00

Garney

BRASS VALVES, STOP COCKS, ETC.

SIZES	¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.
Jenkins Disc Globe Iron Wheel	$1.10	$1.25	$1.60	$2.20	$2.80	$4.00	$5.50	$8.75	$15.75	$22.00
Jenkins Disc Angle Iron Wheel	1.10	1.25	1.60	2.20	2.80	4.00	5.50	8.75	15.75	22.00
Horizontal Swing Check Valves	.....	.....	2.00	2.25	2.80	3.65	4.75	6.75	.....	.....
Steam Cocks, Standard Square Head and Flat Head	.85	1.00	1.25	1.70	2.35	3.70	4.85	7.30	.....	.....
Compression Bibb for Iron Pipe, per dozen, finished	.....	.....	19.80	33.00	60.00	.....	.....	.....	.....	.....
Compression Bibb, Hose and Iron, per dozen, finished	.....	21.60	22.80	36.00	67.20	.....	.....	.....	.....	.....
Compression Stop Cocks, dozen, finished	.....	16.20	19.80	33.00	60.00	.....	.....	.....	.....	.....
Stops, Lever Handle, R.B., dozen	19.80	20.40	21.00	36.00	52.80	89.40	149.40	.....	.....	.....
Standard Peet, screwed	.....	.....	1.65	2.05	2.80	3.70	5.00	7.30	.....	.....
Standard Gate, screwed	.....	.....	1.65	2.05	2.80	3.70	5.00	7.30	.....	.....
Compression Gauge Cocks	.....	1.10	1.20	1.30	.....	.....	.....	.....	.....	.....

PIPE HANGERS

SIZES	½″	¾″	1″	1¼″	1½″	2″	2½″	3″	3½″	4″	4½″	5″	6″	7″	8″	9″	10″
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Grabler Hanger Rings	.14	.14	.16	.18	.20	.22	.24	.26	.30	.32	.34	.36	.40	.63	.88	1.10	1.35
Grabler Extension Bar, 10-foot lengths, per foot	.08	.08	.08	.08	.08	.09	.09	.09	.10	.10	.10	.10	.10	.20	.20	.28	.28
Grabler Lag Screws, with flattened end and bolt			No. 1 .10 each				No. 2 .12 each			No. 3 .14 each							

Grabler Steel Hook Plates — Size of Pipe	1 inch	1¼ inch	1½ inch	2 inch
Number of hooks per length	30	30	25	20
List price, per length	$2.50	$3.25	$3.75	$4.25

HONEYWELL HEAT GENERATORS

No. 1 for 1200 feet Reductions	$25.00 each	No. 3 for 3500 feet Reductions	$50.00 each
No. 2 for 2500 " "	35.00 "	No. 4 for 10,000 " "	65.00 each

FLOOR AND CEILING PLATES

SIZES		½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.
C. I. Floor	Plain	$0.06	$0.06	$0.08	$0.11	$0.14	$0.16	$0.24	$0.30	$0.35	$0.42
" "	Plated	.12	.12	.14	.18	.22	.26	.35	.45	....	....
" Ceiling	Plain	.11	.13	.16	.18	.23	.27	.36	.50	.55	.68
" "	Plated	.14	.17	.20	.23	.30	.35	....	....	....	....
Spun Brass Floor	Plated	.14	.14	.18	.22	.30	.35	.42	.55	....	....
" " Ceiling	Plated	.20	.22	.24	.30	.35	.43	.55	.75	....	....
" " with Screw	Plated	.22	.24	.26	.32	.38	.46	.60	.80	....	....
B. & C. 2 piece Floor	Plain	.16	.17	.20	.22	.25	.30	.50	.65	.80	1.00
" " Ceiling	Plated	.27	.28	.32	.35	.38	.45	.65	.80	1.00	1.25
Grabler Floor	Plated	.25	.25	.28	.32	.35	.38	.52	.75	1.10	1.50
" Ceiling	Plated	.25	.25	.28	.32	.35	.38	.52	.75	1.10	1.50

EXPANSION TANKS

Seamed Galvanized Iron. Complete with gauge glass and brass mountings.

Size 12 x 24 inches.	Complete	each	$6.25
Size 12 x 30 inches.	Complete	"	7.25
Size 14 x 30 inches.	Complete	"	8.75
Trimmings only		per set	1.00

THERMOMETERS and GAUGES

Hot Water Thermometer, Straight (Mercury)	each	$2.25
Altitude Gauges	"	6.00
Steam Gauges, low pressure	"	5.00

FITTINGS—CAST IRON

SIZES	¼ in.	⅜ in.	½ in.	¾ in.	1 in.	1¼ in.	1½ in.	2 in.	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.	6 in.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Crosses	.....	.....	0.16	0.22	0.27	0.42	0.53	0.75	1.30	2.00	2.70	3.15	4.60	5.50	7.25
Elbows, 90°	0.05	0.05	.06	.08	.10½	.16	.20	.28	.50	.75	1.05	1.20	1.75	2.00	2.75
" Reducing	.....	.....	.07	.09	.12	.18	.23	.32	.60	.85	1.20	1.40	2.00	2.30	3.15
" R. and L.	.06	.06	.07	.09	.12	.18	.23	.32	.60	.85	.....	.....	.....	.....	.....
" 45°	.....	.06	.07	.10	.12	.19	.24	.34	.60	.90	1.25	1.45	2.20	2.50	3.45
Tees	.08	.08	.09	.12	.15	.23	.29	.41	.73	1.10	1.50	1.75	2.55	3.00	4.00
" Reducing	.....	.....	.10	.14	.17	.27	.33	.47	.83	1.25	1.75	2.00	2.95	3.50	4.60
Caps	.....	.....	.....	.....	.....	.....	.....	.26	.40	.54	.75	.87	1.05	1.20	1.55
" Malleable, use pound list															
Plugs, R.H.	.02	.02	.02	.03	.04	.05	.07	.10	.18	.25	.38	.42	.65	.88	1.20
" Left H.	.....	.....	.....	.06	.08	.09	.11	.15	.....	.....	.....	.....	.....	.....	.....
" Solid	.04	.04	.04	.06	.08	.09	.11	.15	.27	.38	.57	.63	1.00	1.35	1.80
" Countersunk	.....	.....	.04	.06	.08	.09	.11	.15	.30	.40	.....	.....	.....	.....	.....
Bushings, R.H.	.....	.04	.04	.05	.06	.07	.09	.14	.21	.30	.40	.50	.75	.93	1.25
" L.H.	.....	.08	.08	.10	.12	.14	.18	.28	.....	.....	.....	.....	.....	.....	.....
Reducers	.....	.....	.....	.....	.....	.....	.....	.43	.60	.80	1.00	1.35	1.85	2.00	2.70
" Eccentric	.....	.....	.....	.....	.....	.....	.....	1.00	1.50	2.40	3.00	4.00	5.00	6.00	8.00
Couplings, R. H. W. I.	.05	.06	.07	.10	.13	.17	.21	.28	.40	.60	.85	1.00	1.50	1.65	2.40
Lock Nuts*	.....	.....	.....	.....	.....	.....	.....	.25	.27	.34	.47	.64	.85	.90	1.30
Hexagon, R. & L. Nipples	.....	.....	.....	.25	.30	.40	.50	.70	.....	.....	.....	.....	.....	.....	.....
Eccentric Bushings	.....	.....	.....	.....	.....	.22	.25	.27	.42	.60	.80	1.00	1.50	1.85	2.50

*For R. & L. H. Malleable Couplings and Malleable Lock Nuts, see Pound List.

WROUGHT IRON NIPPLES—RIGHT HAND

Length, Inches						Size, Inches	List		Price of Extra Long Nipples								
									Inches								
Close	Short	Long					Close or Short	Long	4	5	6	7	8	9	10	11	12
1⅛	1½	2	2½	3	3½	½	$.05	$0.07	$0.08	$0.10	$0.12	$0.14	$0.16	$0.18	$0.20	$0.22	$0.23
1⅜	2	2½	3	3½	4	¾	.06	.09	......	.11	.13	.17	.18	.20	.22	.24	.26
1½	2	2½	3	3½	4	1	.08	.13	......	.15	.18	.23	.25	.28	.31	.34	.36
1⅝	2½	3	3½	4	4½	1¼	.11	.17	......	.20	.24	.29	.33	.36	.40	.44	.47
1¾	2½	3	3½	4	4½	1½	.13	.20	......	.25	.29	.36	.40	.45	.50	.54	.59
2	2½	3	3½	4	4½	2	.18	.27	......	.32	.35	.50	.54	.59	.65	.72	.77
2½	3	3½	4	4½	5	2½	.39	.59	......	......	.68	.90	.97	1.06	1.17	1.26	1.35
2½	3	3½	4	4½	5	3	.48	.72	......	......	.85	1.08	1.20	1.33	1.45	1.58	1.70
2¾	4	4½	5	5½	6	3½	.75	1.05	......	......	......	1.30	1.45	1.60	1.75	1.90	2.05
3	4	4½	5	5½	6	4	.85	1.20	......	......	......	1.52	1.69	1.87	2.05	2.22	2.40
3	4	4½	5	5½	6	4½	1.25	1.70	......	......	......	2.25	2.50	2.75	2.95	3.17	3.40
3¼	4½	5	5½	6	6½	5	1.55	2.45	......	......	......	2.58	2.83	3.10	3.35	3.60	3.85
3¼	4½	5	5½	6	6½	6	1.85	2.90	......	......	......	3.05	3.35	3.70	4.00	4.30	4.65
3½	5	......	......	......	......	7	3.20	......	......	......	3.60	4.05	4.45	4.90	5.30	5.75	6.15
3½	5	......	......	......	......	8	3.55	......	......	......	4.05	4.55	5.05	5.50	6.00	6.50	7.00

WROUGHT IRON NIPPLES—RIGHT AND LEFT HAND

Length, Inches						Size, ins.	List		Price of Extra Long Nipples								
Close	Short	Long					Close or Short	Long	Inches								
									4	5	6	7	8	9	10	11	12
1 1/8	1 1/2	2	2 1/2	3	3 1/2	3/4	$0.07	$0.10	$0.11	$0.13	$0.16	$0.18	$0.21	$0.24	$0.27	$0.29	$0.31
1 3/8	2	2 1/2	3	3 1/2	4		.08	.12	.....	.15	.17	.23	.25	.27	.29	.32	.35
1 5/8	2	2 1/2	3	3 1/2	4	1	.11	.18	.....	.20	.24	.31	.33	.37	.41	.45	.48
1 7/8	2 1/2	3	3 1/2	4	4 1/2	1 1/4	.15	.23	.....	.27	.32	.39	.45	.50	.55	.60	.65
2	2 1/2	3	3 1/2	4	4 1/2	1 1/2	.18	.27	.....	.34	.39	.48	.52	.60	.67	.72	.80
2 1/2	3	3 1/2	4	4 1/2	5	2	.24	.36	.....	.43	.51	.67	.72	.80	.87	.96	1.03
2 1/2	3	3 1/2	4	4 1/2	5	2 1/2	.52	.79	.....	.....	.91	1.20	1.30	1.40	1.55	1.68	1.80
2 1/2	3	3 1/2	4	4 1/2	5	3	.65	.96	.....	.....	1.13	1.44	1.60	1.77	1.93	2.10	2.27
2 3/4	4	4 1/4	5	5 1/2	6	3 1/2	1.00	1.40	.....	.....	.....	1.75	1.95	2.15	2.35	2.55	2.75
3	4	4 1/4	5	5 1/2	6	4	1.15	1.60	.....	.....	.....	2.00	2.25	2.50	2.75	3.00	3.25

UNIONS

SIZES	1/4 in.	3/8 in.	1/2 in.	3/4 in.	1 in.	1 1/4 in.	1 1/2 in.	2 in.	2 1/2 in.	3 in.	3 1/2 in.	4 in.	4 1/2 in.	5 in.	6 in.
	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.	$ c.
Standard Malleable	0.18	0.20	0.22	0.27	0.33	0.46	0.58	0.75	1.55	2.10	....	....	....	....	....
Standard Flanged	....	....	....	....	.52	.64	.78	1.00	1.25	1.50	1.80	2.10	2.70	3.15	3.95
Dart, with brass joint	.30	.40	.50	.60	.80	1.20	1.60	2.00	3.20	4.80	....	....	....	....	....

Crane

Gurney

BRANCH TEES

No. 1. FOR CIRCULATION

OUTLET OPEN

No. 2. FOR CIRCULATION

INLET OPEN

No. 3. FOR BOX COILS

Number of Branches	1″ Branch Tees		1¼″ Branch Tees		1½″ Branch Tees		2″ Branch Tees	
	2½″ Centre to Centre		3″ Centre to Centre		3½″ Centre to Centre		4½″ Centre to Centre	
	1″ or 1¼″ *Run	1½″ Run	2″ Run	2½″ *Run	1½″ or 2″ *Run	2½″ Run	2½″ Run	3″ *Run
2	$0.90	....	....	....	....	....	....	....
3	1.05	....	$1.90	....	$2.70	$3.45	$5.75	....
4	1.15	$1.30	2.40	....	3.35	4.15	7.00	....
5	1.35	1.45	2.90	$3.55	4.00	5.00	8.50	$9.25
6	1.60	1.75	3.30	3.95	4.65	5.75	9.75	10.75
7	1.90	2.20	3.90	4.20	5.25	6.50	11.75	13.00
8	2.20	2.45	4.50	4.95	5.85	7.00	12.75	14.00
9	2.65	2.90	5.25	6.15	6.50	8.25	13.50	15.00
10	3.00	3.30	5.85	6.85	7.60	9.25	15.00	16.50
11	3.35	4.50	6.25	7.25	8.00	9.75	15.75	17.25
12	3.75	4.75	6.50	7.65	8.50	10.50	16.50	18.25

1	in. Branch Tees,	1 or 1¼	in. Run are	1⅞	in. inside diameter.			
1	" "	1½ or 2	" "	2½	" "	"		
1¼	" "	2	" "	2½	" "	"		
1¼	" "	2½	" "	3	" "	"		
1½	" "	1½ or 2	" "	2½	" "	"		
1½	" "	2½	" "	3	" "	"		
2	" "	2½	" "	3	" "	"		
2	" "	3	" "	3½	" "	"		

*NOTE—Our standard covers 1¼″ run for 1″ Branch Tees; 2½″ run for 1¼″ Branch Tees and 2″ run for 1½″ Branch Tees. Other runs are supplied at other lists, but not as promptly as standard.

Gurney

STANDARD CAST IRON FLANGES.

Size of Valve	Diameter of Flange, Inches	Thickness of Flange, Inches	Diameter of Bolt Circle, Inches	Number of Bolts	Size of Bolts, Inches	Length of Bolts, Inches	List Price of Companion Flanges, Faced and Drilled, Each	List Price of Bolts and Nuts Per Set for Each Joint	Bolting Companion Flanges on Standard Valves
4	9	15–16	$7\frac{1}{2}$	8	$\frac{5}{8}$	$2\frac{3}{4}$	$1.80	$0.50	$4.50
4$\frac{1}{2}$	$9\frac{1}{4}$	15–16	$7\frac{3}{4}$	8	$\frac{3}{4}$	3	1.90	.75	5.75
5	10	15–16	$8\frac{1}{2}$	8	$\frac{3}{4}$	3	2.05	.75	6.25
6	11	1	$9\frac{1}{2}$	8	$\frac{3}{4}$	3	2.50	.75	6.75
7	$12\frac{1}{2}$	$1\frac{1}{16}$	$10\frac{3}{4}$	8	$\frac{3}{4}$	3	3.25	.75	8.75
8	$13\frac{1}{2}$	$1\frac{1}{8}$	$11\frac{3}{4}$	8	$\frac{3}{4}$	$3\frac{1}{4}$	3.80	.80	9.50
9	15	$1\frac{1}{8}$	$13\frac{1}{4}$	12	$\frac{3}{4}$	$3\frac{1}{4}$	4.65	1.20	12.50
10	16	$1\frac{3}{16}$	$14\frac{1}{4}$	12	$\frac{7}{8}$	$3\frac{1}{2}$	5.50	1.60	14.50
12	19	$1\frac{1}{4}$	17	12	$\frac{7}{8}$	$3\frac{3}{4}$	7.65	1.70	18.50

DRILLING PRICE LIST FLANGED VALVES.

Size of Valve	Drilling Valves with Two Flanges except Angle Valves Price, Each	Drilling Angle Valves Price, Each
4	$1.25	$1.75
4$\frac{1}{2}$	1.50	2.00
5	1.50	2.50
6	1.75	3.00
7	2.25	3.00
8	2.25	3.00
9	2.50	3.50
10	2.50	3.50
12	3.50	5.00

Gurney

AIR CELL COVERING.

For Wrought Iron Pipe

Inside Diam. of Pipe Inches	Price per lin. ft. Canvas Jacketed	Inside Diam. of Pipe Inches	Price per lineal ft. Canvas Jacketed
¼ ⅜ ½	$0.22	4	$0.60
¾	.24	4½	.65
1	.27	5	.70
1¼	.30	6	.80
1½	.33	7	1.00
2	.36	8	1.10
2½	.40	9	1.20
3	.45	10	1.30
3½	.50	..	....

For "Moulded" Asbestos Sectional, Use Same List

The sections are 36 inches in length. A sufficient number of fastenings furnished without additional charge. Sold in full sections only.

Asbestos cement in 100 lb. bags at market price.

One bag covers 10 square feet 2 inches thick.

Gurney

ASBESTOS BOILER COVERING.

Quantity Asbestos Plaster in Pounds Required for Covering Gurney Hot Water and Steam Boilers

Number of Boiler	Lbs. Required			Number of Boiler	Lbs. Required		
	1¼" Thick	1½" Thick	2" Thick		1¼" Thick	1½" Thick	2" Thick
...	...	...	...	**937**	500	600	800
1-G	100	125	175	**938**	550	675	875
2-G	150	175	225	**939**	600	700	950
3-G	150	175	250	**945**	500	625	850
4-G	175	200	275	**946**	575	700	950
5-G	200	250	325	**947**	650	775	1050
6-G	250	275	375	**948**	700	850	1150
6½-C	300	350	475	**949**	775	925	1250
7-B	300	375	500	**1021**	400	450	600
8-C	350	400	525	**1022**	400	500	675
9-D	350	400	525	**1023**	450	550	725
10-C	400	500	700	**1024**	500	600	775
914	200	275	350	**1025**	500	625	825
915	275	300	400	**1130**	575	700	900
916	300	350	475	**1131**	600	725	975
917	350	400	550	**1132**	650	775	1050
924-A	250	300	400	**1133**	700	800	1100
925-A	275	325	450	**1250**	800	975	1300
926-A	300	375	500	**1251**	850	1025	1375
927-A	350	400	550	**1252**	900	1100	1450
934	350	400	550	**1253**	1000	1200	1600
935	400	475	625	**1254**	1100	1325	1775
936	450	525	700	**1255**	1175	1400	1850

Note.—Asbestos Plaster is sold in 100-lb. bags. It requires only mixing in water to a consistency of mortar. All heating boilers should be thoroughly covered, which will effect a considerable fuel saving.

Gurney

DIMENSIONS OF STANDARD WEIGHT STEAM AND WATER PIPES.

Jan. 1st, 1913.

Size	Internal Diameter	External Diameter	Length of Pipe per Sq. ft. of Exter. Surface	Sq. ft. Exter. Surface per 100 Lineal ft.	Water Contained pe Lineal ft.	Thr'd per Inch	Weight er ft.
Inches	Inches	Inches	Feet	Sq. feet	Pounds	Number	Pounds
$\frac{1}{4}$	0.364	0.540	7.075	14.13	.044	18	0.425
$\frac{3}{8}$	0.493	0.675	5.657	17.67	.082	18	0.568
$\frac{1}{2}$	0.622	0.840	4.502	22.21	.132	14	0.852
$\frac{3}{4}$	0.824	1.050	3.637	27.49	.231	14	1.134
1	1.049	1.315	2.903	34.44	.373	$11\frac{1}{2}$	1.684
1$\frac{1}{4}$	1.380	1.660	2.301	43.46	.648	$11\frac{1}{2}$	2.281
1$\frac{1}{2}$	1.610	1.900	2.010	49.75	.880	$11\frac{1}{2}$	2.731
2	2.067	2.375	1.611	62.07	1.453	$11\frac{1}{2}$	3.678
2$\frac{1}{2}$	2.469	2.875	1.328	75.30	2.076	8	5.819
3	3.068	3.500	1.091	91.66	3.200	8	7.616
3$\frac{1}{2}$	3.548	4.000	0.955	104.72	4.281	8	9.202
4	4.026	4.500	0.849	117.78	5.512	8	10.889
4$\frac{1}{2}$	4.506	5.000	0.765	130.72	6.906	8	12.642
5	5.047	5.563	0.687	145.56	8.660	8	14.810
6	6.065	6.625	0.577	173.95	12.509	8	19.185
7	7.023	7.625	0.501	199.60	16.774	8	23.769
8	7.981	8.625	0.444	225.22	21.666	8	28.809
9	8.941	9.625	0.397	252.52	27.165	8	31.188
10	10.020	10.750	0.355	281.69	34.138	8	41.132
11	11.000	11.750	0.325	307.69	41.150	8	46.247
12	12.000	12.750	0.299	334.44	48.971	8	50.706

Gurney

USEFUL INFORMATION

In the following pages will be found information, data and tables of service to all interested in any way in the design, erection and operation of heating apparatus.

We will be glad to co-operate with you in your heating problems. Let us hear from you. Our Engineering Department is at your service.

Gurney

THE BRITISH THERMAL UNIT AND ITS APPLICATION TO THE SOLUTION OF HEATING PROBLEMS

The British Thermal Unit (abbreviated B.T.U.) is the basis of all heating calculations. It is the quantity of heat required to raise one pound of water 1 degree of Fahrenheit.

One square foot of single glass will transmit 1 heat unit for each degree of difference between the inside and the outside temperatures.

4 square feet of 9-inch brick wall, furred and plastered (usual house construction), will transmit 1 heat unit for each degree of difference between the inside and the outside temperature.

1 B.T.U. will raise 55 cubic feet approximate of air 1 degree of Fahrenheit. 1.4392 B.T.U. will raise 1 cubic ft. of air from 0° to 70° Fahrenheit.

B.T.U. Equivalents in Electricity and Gas.

1 B.T.U. is equal to .2930 watt hours.

1 kilowatt hour (1,000 watt hours) is equal to 3,400 B.T.U.

730 B.T.U. equals the average heating value of one cubic foot of natural gas.

Heat Emission from Radiators.

1 foot of average cast iron direct radiation will emit 1.6 B.T.U. for each degree of difference between the temperature of the heating medium (steam or hot water) and the surrounding air, and wall radiators likewise emit 2 B.T.U.

1 foot* of standard (38 in.) cast iron steam radiation will emit 250 B.T.U. per hour, and with water 150 B.T.U. per hour (approximate). This is based on steam 5-lb. gauge pressure (225 degrees Fahrenheit) and water at 165.

1 foot cast iron wall radiation with steam as above will emit .310 B.T.U. and with water 190 B.T.U. per hour.

The application of the above are found in rules 3 and 4 for determining the necessary quantities of radiating surface and form the foundation of any rules that approach exactness (see pages 108 and 109.

970.4 B.T.U. are required to turn each pound of water at 212 degrees Fahrenheit into steam at atmospheric pressure (14.7 pounds per square inch absolute), or 970.4 B.T.U. are emitted when one pound of steam is condensed to water at the same temperature (212 degrees Fahrenheit). This is known as Latent Heat. For other properties of steam see table page 117.

Boiler Horse Power Equivalent in B.T.U.'s.

34½ pounds of water evaporated per hour at 212 degrees is equal to 1 boiler horse power, or the evaporation of 30 pounds of water from 100 degrees Fahrenheit to steam at 70 pounds gauge pressure, is equal to 1 H.P.

1 boiler horse power is equal to 33,478.8 B.T.U. (commonly accepted at 33,000 B.T.U.), that is, 970.4 x 34.5, equals 33,478.8.

Boiler H.P. Equivalent in Cast Radiation.

1 boiler horse power is equal to 134 feet* of direct cast iron steam radiation; that is, 33,478.8 divided by 250 (B.T.U. emitted per hour per foot*) equals 134, or 1 foot of cast iron steam radiation is equal to .00747 boiler horse power.

1 boiler horse power is equal to 223.2 feet* of cast iron hot water radiation; that is, 33,478.8 divided by 150 (B.T.U. emitted per hour per square inch), equals 223.2, or 1 foot* of cast iron hot water radiation is equal to .00448 boiler horse power.

Quantity of Steam Condensed Per Foot* of Radiation.

4 feet (approximate) of cast iron steam radiation, when the surrounding temperature is 70 degrees Fahrenheit, will condense 1 pound of steam, or, assuming the latent heat of evaporation at 2 pounds pressure as 966 B.T.U. per pound of steam, then 1 pound of steam will supply four feet of cast iron steam radiation; that is, 966, the total available heat units divided by 250, the amount emitted by 1 foot, is equal to 3.87 (approximately).

*See page 2.

Gurney

British Thermal Units Contained in Coal.

1 pound of coal contains on an average 12,000 B.T.U. (this varies with different coal from 11,000 for free-burning lignite to 15,000 for best bituminous and Pennsylvania anthracites).

Heating Value of Coal.

65 to 70% of the heating value of coal is available in heating water and evaporation of water into steam, that is, 7,800 to 8,400 British Thermal Units can be utilized from the burning of each pound of coal. The available heating value of coal may be approximated as 8,000 B.T.U. per pound. From three to ten pounds of coal can be burned per hour for each square foot of grate surface of the boiler or furnace, so that the quantity of water heated and its temperature or the quantity of water evaporated into steam largely depends on the rate of combustion.

Quantity of Water Heated by Coal Consumed at Differing Rates Per Square Foot Per Hour.

6 pounds of coal per hour burned on one square foot of grate with the proper draft would make available 48,000 B.T.U. and would raise the temperature of 500 pounds or 60 U. S. gallons of water from 50 degrees to 146 degrees Fahrenheit in one hour.

Explanation: 6 (pounds of coal) x 8,000 (available B.T.U.) equals 48,000. Each United States gallon of water weighs 8.33 pounds, so 60 U. S. gallons would weigh 499.8 pounds (or nearly 500 pounds). We have seen that one B.T.U. will raise the temperature of one pound of water one degree Fahrenheit, so 96 B.T.U. would raise one pound of water 96 degrees. Then 48,000 (total available B.T.U.) divided by 96 equals 500. or the number of pounds of water that will be raised 96 degrees (146-50=96), or if we divide 48,000 by 500 (pounds of water to be heated), then we have 96, or 96 degrees—the temperature to which 500 lbs. of water (60 U. S. gallons) will be heated when 6 pounds of coal are burned.

10 pounds of coal burned in one hour on one square foot of grate as stated would raise the temperature of 833 pounds or 100 U. S. gallons of water from 50 degrees to 146 degrees Fahrenheit in one hour. Otherwise the 10 pounds of coal burned as above would raise 13.37 cubic feet of water from 50 to 146 degrees.

From this it will be seen that the capacity of any heater to be selected depends on the size of the tank—or quantity of water to he heated, the rate of combustion, and the raise in temperature desired in degrees Fahrenheit. The three factors, quantity, time and temperature, are controlling factors and must be first known before the required size of tank heater can be determined. Otherwise, with any three factors known the fourth can be found.

Quantity, Volume and Weight of Water Heated to Varying Temperatures by 1 lb. of Coal.

Assuming 8,000 B.T.U. as the available heating value of coal, then

	Quantity of water U. S. gallon.	Total degrees Fahrenheit	Temperature of water.
1 lb. of coal will raise	10	96 or from	50° to 146°
1 lb. of coal will raise	20	48 or from	50° to 98°
1 lb. of coal will raise	29	28 or from	50° to 78°
	Quantity of water Imp. gals.		
1 lb. of coal will raise	8.3	96 or from	50° to 146°
1 lb. of coal will raise	16.6	48 or from	50° to 98°
1 lb. of coal will raise	24.2	28 or from	50° to 78°
	Volume of water Cub. Ft.		
1 lb. of coal will raise	1.33	96 or from	50° to 146°
1 lb. of coal will raise	2.66	48 or from	50° to 98°
1 lb. of coal will raise	3.88	28 or from	50° to 78°
	Weight of water, lbs.		
1 lb. of coal will raise	83.3	96 or from	50° to 146°
1 lb. of coal will raise	166.6	48 or from	50° to 98°
1 lb. of coal will raise	241.6	28 or from	50° to 78°

(Hot Water Storage Tanks are listed in U. S. Gallons and other quantities of water are usually calculated in Imperial gallons, pounds, or cubic feet. See useful data, page 133).

Heating a Swimming Pool by Direct Circulation.

A swimming pool 20 feet x 35 feet, having an average depth of water 5 feet, would require 6,107,458 B.T.U. to raise the temperature of the water 28° Fahrenheit, or from 50 to 78° (the latter is the usual required temperature for swimming pools), and to do this work it would require the burning of 764 pounds of coal, which if burned at the rate of 8 pounds of coal per hour per square foot of grate surface for 7 hours would mean a boiler or furnace having 13.6 square feet of grate area; as for example, a grate that is 42 in. x 36 in. or 30 in. x 63 in.

Explanation: The total water to be heated in cubic feet would be 20 x 35 x 5, equals 3,500 cubic feet; a cubic foot of water weighs 62.321 pounds, and then there would be in this pool 3,500 x 62.321, equals 218,123.5 pounds of water. The water is to be raised 28 degrees Fahrenheit, and as one B.T.U. will raise 1 pound of water 1 degree, then 218,123.5 x 28 equals 6,107,458, or the total number of B.T.U.'s necessary to raise this volume of water 28 degrees.

As a pound of coal is assumed to provide 8,000 available B.T.U.'s, it will be necessary to burn as many pounds of coal as 8,000 is contained in 6,107,458, which is 764 times; 6,107,458 divided by 8,000 equals 764 pounds of coal. As the work is to be done in 7 hours, then divide 764 by 7, which is 109, or there would be burned 109 pounds of coal per hour, and as 8 pounds of coal per hour per square foot of grate is rate of combustion assumed, then divide 109 by 8, which gives 13.6, or the required amount of grate area in square feet.

How to Find the Size of Boiler to Heat Any Quantity of Water to Any Temperature in Any Given Time.

The following formula forms the basis for finding the grate area of boiler required for the heating of large volumes of water from any known temperature to any determined temperature.

Length x Width x Depth (or height) in feet equals cubic feet.

Cubic feet of water x 63.231 equals pounds of water.

Pounds of water x degrees Fahrenheit raise, equals total B.T.U.'s.

Total B.T.U.'s divided by 8,000 equals pounds of coal required.

Pounds of coal divided by hours of heating equals coal burned per hour.

Coal per hour divided by rate per square foot of grate equals area of grate in square feet.

DATA RE BRASS COILS IN HOT WATER STORAGE TANKS

4 sq. ft. of heating surface in brass pipe (=12 lineal feet of 1″ pipe) will raise the temperature of the water in a 400 gallon (U.S.) tank from 40 to 140 degrees Fahrenheit in 2 hours with a steam pressure of 5 lbs. The steam condensed will be 44 lbs. per sq. ft. per hour or 176 lbs. or approximately the same as would be condensed by 700 feet of direct radiation used for heating.

Approximately there may be allowed 3 feet of 1″ brass pipe (=1 sq. ft.) for each 100 gallons (U. S.) to be heated per hour with a raise of 100 degrees.

Above is taken for average conditions. If the pipe is new the amount of water heated will be greater; if the pipe is fouled then less water will be heated.

Time, temperatures and volume are the controlling factors that determine the quantity of steam required to heat the water and the amount of condensation.

Gurney

COMPUTING QUANTITIES OF RADIATION.

Four Good Rules.

(1) Divide the glass surface by 2 and the wall surface exposed by 10. The sum of these two quantities equals the amount of steam radiation required for 70 degrees inside with zero outside.

(2) Divide the glass surface by 2, the wall surface exposed by 20, and the cubic contents by 200. The sum of the three quantities equals the amount of steam radiation required for 70 degrees with zero outside (Mill's rule).

(3) Divide the wall surface by 4, the cubic contents by 55 (for one change of air per hour, or 27 for two changes of air per hour), and to these quantities add the glass surface and divide the sum by 4. For steam radiation required for 70 degrees inside with zero outside (Carpenter's rule).

(4) Divide the net outside wall surface by 4 and the cubic contents by 55 (for one change of air per hour), and to these quantities add the glass surface. Multiply the sum by the difference between the outside temperature and the desired inside temperature. Divide the product by 255 for steam and 155 for hot water direct radiation. This rule provides for any range of temperature desired.

The following additions are to be made to any calculations for exposures: North and west, 20 per cent.; east, 10 per cent. Also see page 111 (3rd page Heat Transmission).

For indirect work add 60 per cent.

To ascertain hot water radiation when steam radiation has been determined, add 60 per cent., or divide steam radiation by 150 and multiply by 250.

Another rule in common practice to give 70 degrees with 40 degrees below zero, is:

For Steam—Divide the cubic contents by 200, exposed wall surface, **less glass,** by 10, and glass

surface by 2. Add the results together and that is the amount of feet of radiation* that will be required for an average exposed room.

For Water—Divide cubic contents by 50, exposed wall, **less glass**, by 10, and glass by 3. This is for east or south exposures. For north or west exposures add another 10 to 15 per cent. Also for the Halls, Bathrooms and Vestibules 40 per cent. should be added to the above figure.

The above are not guaranteed, but are from the best authorities.

*See page 2.

CONSTANTS FOR HEAT TRANSMISSION

B.T.U. transmitted per square foot per hour per degree difference in temperature between inside and outside temperature. Surface constant given below equals B.T.U.'s loss per degree per hour.

Constants for Brick Work

Thickness of wall, inches	8	12	16	20	24	30	36
B.T.U. per sq. ft. per hour per degree difference in temperature	.46	.33	.27	.23	.20	.18	.15

Constant for Ordinary Furred Brick Walls—Plastered Inside

Thickness of wall, inches	8	12	16	20	24	28	32
B T.U. per sq. ft. per hour per degree difference in temperature	.23	.21	.19	.16	.14	.13	.12

Constants for Stone Walls, Rubble or Block Masonry

Thickness of wall, inches	12	16	20	24	28	36	44
B.T.U. per sq. ft. per hour per degree difference in temperature	.45	.40	.36	.30	.27	.25	.20

Gurney

CONSTANTS FOR HEAT TRANSMISSION—Continued.

Outside Walls of Frame Buildings

Considered as having lath and plaster inside and an outside covering as below:

	B. T. U. per sq. ft. per hour per degree difference in temperature.
Ordinary overlapping Clapboards 7/16 in. thick	.44
Ordinary overlapping Clapboards and Paper	.31
Ordinary overlapping Clapboards and ¾ Sheathing	.28
Ordinary overlapping Clapboards, ¾ Sheathing and Paper	.23

Constants for Pine Planks

Thickness planking, inches	1½	2	2½	3
B.T.U. per sq. ft. per hour per degree difference in temperature	.30	.26	.23	.20

Constants for Windows, Skylights, and Outside Walls

	B. T. U. per sq. ft. per hour per degree difference in temperature.
Single window	1.10
Double window	.50
Single skylight	1.16
¾ inch sheathing and clapboards	.30
¾ inch sheathing, paper and clapboards	.23

Constants for Heat Losses through Partitions, Floors and Ceilings.

	B. T. U. per sq. ft. per hour per degree difference in temperature.
Stud partition, lath and plaster one side	.26
Stud partition, lath and plaster both sides	.15
Ordinary lath and plaster ceiling separating unheated space from heated rooms	.26

CONSTANTS FOR HEAT TRANSMISSION—Continued.

Floor, single, thickness ¾ inch, warm air above and cold space below:

A. No plaster beneath joists.....	.20
B. Lath and plaster beneath joists..	.12

Floor, double, thickness 1½ inches warm room above and cold space below:

A. No plaster beneath joists.....	.13
B. Lath and plaster beneath joists..	.08

Note.— the above values are compiled from well-known authorities.

Constants for heat losses stated in tables on preceding pages should be increased as follows:

For northeastern, northwestern, western or northern exposure.....	20 to 30%
For rooms 13 to 14½ feet high.....	6½%
For rooms 14½ to 18 feet high.....	10%
When building is heated during the day only	30%
When building remains for long periods without heat	50%

Air Leakage.

The question of air leakage is an important one, and should always be considered when figuring radiating surface. No definite allowance can be made with the exception, of course, where rooms are provided with ventilating flues which are allowed for independently, but the following rule is used with good results by many engineers:

Multiply the cubic contents in feet by .04 for rooms with two exposures and .02 for rooms with one exposure, and add to heat losses by transmission and exposure as given in tables on opposite page and above.

Note.—By referring to page 108, Rules 3 and 4, and from the above it will be seen that one square foot of single window transmits practically four times as much heat in the same time as an 8-inch brick wall lathed and plastered.

The factors given above will give any corresponding relations for different materials.

Gurney

GREENHOUSE HEATING.

Estimating Radiation.

The area in square feet of glass surface, wall surface, the exposure, the construction of the building, the outside temperature and the uses to which the house is to be put, are all to be considered when calculating the amount of radiation required. The table herewith given will be found useful for any required inside temperature ranging from 40 degrees to 70 degrees and with outside temperatures ranging from zero to 40 degrees below zero Fahrenheit. It is necessary to have ample radiating surface, also boilers of ample capacity to take care of quick drops in temperature easily. The surface of wrought iron pipe is as follows:

1 foot of 1 in. pipe has 344 sq. ft. of surface.
1 foot of 1¼ in. pipe has .434 sq. ft. of surafce.
1 foot of 1½ in. pipe has .497 sq. ft. of surface.
1 foot of 2 in. pipe has .621 sq. ft. of surface.

Sizes of Mains.

For houses of average length and coils well above the heater, the mains for hot water may be proportioned as follows:

For 200 to 300 sq. ft. of surface 2 in.
For 300 to 500 sq. ft. of surface 2½ in.
For 600 to 800 sq. ft. of surface 3 in.
For 800 to 1,100 sq. ft. of surface 3½ in.

The longer the mains and the less the coils are above the heater, the larger the mains must be.

If mains are short and the coils well elevated above heater they wil carry increased amount of surface.

Arrangements of Coils.

For coils up to 40 feet use 1¼ in. pipe up to 75 feet, 1½ in. pipe, and for coils longer than this use 2 in. pipe. It is better to use two or more coils in long houses instead of the long coils, and have the coils valved so that any part can be closed off if desired. Tests have shown little or no difference in so far as the growth of plants, whether over-head heating or under-the-bench heating has been used, and the mains and coils can be arranged to suit varying conditions.

To get the best circulation the mains should be overhead and the coils beneath the benches, with the heater well below the coils.

Gurney

GREENHOUSE HEATING.

Radiating Surface Required for Greenhouse Heating at Various Temperatures Zero Weather

Square feet of Glass	STEAM — Radiation Required at 40°	45°	50°	60°	70°
25	2 7-9	3 1-8	3 4-7	4 1-6	5
50	5 5-9	6 1-4	7 1-7	8 1-3	10
75	8	9	10	13	15
100	11	13	14	17	20
200	23	25	30	33	40
300	34	38	43	50	60
400	45	50	57	67	80
500	56	63	72	83	100
1,000	112	125	143	167	200
2,000	223	250	286	333	400
3,000	334	375	429	500	600
4,000	445	500	571	667	800
5,000	556	625	714	833	1,000
10,000	1,112	1,250	1,429	1,667	2,000
20,000	2,223	2,500	2,857	3,333	4,000

Square feet of Glass	HOT WATER — Radiation Required at 40°	45°	50°	60°	70°
25	4 1-6	5	6 1-4	7 1-7	8 1-3
50	8	10	13	14	16
75	13	15	19	21	25
100	17	20	25	29	33
200	33	40	50	57	67
300	50	60	75	86	100
400	67	80	100	114	133
500	83	100	125	143	167
1,000	167	200	250	286	333
2,000	333	400	500	572	667
3,000	500	600	750	857	1,000
4,000	667	800	1,000	1,143	1,333
5,000	833	1,000	1,250	1,429	1,667
10,000	1,667	2,000	2,500	2,857	3,333
20,000	3,333	4,000	5,000	5,714	6,667

For 10 degrees below zero multiply feet* radiation by 1.11.
For 20 degrees below zero multiply feet* radiation by 1.23.
For 30 degrees below zero multiply feet* radiation by 1.35.
For 40 degrees below zero multiply feet* radiation by 1.48.

*See page 2.

Gurney

SIZES OF MAINS.

The size of steam mains depends on four factors, viz.: the surface to be carried, the velocity of the steam, the drop in pressure, and length of mains. No arbitrary rule can be laid down to suit all cases.

The sizes given in the following table are considered conservative, and are to be used under ordinary conditions:

Mains Not Exceeding 100 Feet in Length

Size of Main, Inches	Feet of Radiation			Returns, Two Pipe Steam	
	Steam, One Pipe	Gravity Water, Two Pipe	Steam, Two Pipe	Dry	Wet
1 1/4	75	100	80	1	1
1 1/2	125	200	180	1	1
2	350	300	325	1 1/2	1 1/4
2 1/2	550	450	650	2	1 1/2
3	1,000	700	1,100	2	2
3 1/2	1,400	900	1,500	2 1/2	2
4	1,800	1,200	2,100	2 1/2	2
4 1/2	2,500	1,500	2,700	3	2 1/2
5	3,000	2,000	3,500	3	2 1/2
6	4,500	3,000	6,000	3 1/2	3

Above two-pipe sizes do not refer to vapor or vacuum systems, for which see pages 115-116.

Where piping is not thoroughly covered it should be figured as radiation. Branch mains carrying water and steam in opposite directions should be increased one size.

Branch mains carrying two or more branches should equal in internal diameter the sum of internal area of the branches. (See table of pipe areas, page 100).

Uptakes from boiler to mains should be of increased sizes.

Above from good authorities, but are not guaranteed.

Gurney

DUNHAM RETURN HEATING SYSTEM.

Pipe Sizes

In sizing piping the following tables will be found a convenient check. The pipe sizes are based upon an initial operating pressure of 1 to 2 lbs., although higher pressures may be used. No smaller piping for the several functions should be used than called for by these tables, and care should be used to ascertain the length of all runs, with allowances added, in determining the sizes.

Steam Mains—Return Heating System

Table 1.

Pipe Sizes Inches	Capacities in Feet of Direct Cast Iron Radiation for Each Length							
	Length in Feet							
	100	200	300	400	500	600	800	1,000
2	670	570	470	410	360	330	290	250
2½	1,090	930	760	670	590	530	470	410
3	1,930	1,650	1,340	1,170	1,030	940	820	730
3½	2,810	2,400	1,950	1,710	1,510	1,370	1,200	1,060
4	3,900	3,340	2,720	2,380	2,100	1,900	1,670	1,480
4½	5,220	4,460	3,630	3,180	2,800	2,550	2,230	1,980
5	7,000	5,950	4,850	4,260	3,740	3,400	2,980	2,640
6	11,200	9,550	7,780	6,830	6,000	5,460	4,780	4,240
7	16,400	14,000	11,400	9,970	8,780	8,000	7,000	6,180
8	23,400	20,000	16,250	14,250	12,540	11,400	10,000	8,840
10	40,800	34,800	28,400	24,800	21,900	19,900	17,400	15,400
12	64,400	55,000	44,700	39,200	34,600	31,400	27,500	24,400

Gurney

DUNHAM RETURN HEATING SYSTEM.

Pipe Sizes

Return Mains—Return Heating System

Table 2.

Pipe Sizes	Capacity in Square Feet								
	1	1¼	1½	2	2½	3	3½	4	5
Mains under 400 ft. Long	400	1,400	2,700	5,500	9,000	16,000	23,000	32,000	57,000
Mains over 400 ft. long	300	1,000	1,700	3,400	5,500	10,000	14,000	20,000	35,000

Steam Main Drips—Return Heating System

Table 3.

Pipe Sizes	1¼	1½	2	2½	3	3½	4	5
Capacity in Sq. Ft.....	1,400	2,700	5,500	9,000	16,000	23,000	32,000	57,000

Riser Sizes—Return Heating System

Table 4.

Pipe Sizes	Steam							Return	
	¾	1	1¼	1½	2	2½	3	¾	1
*Length, 200 feet.	45	90	190	290	570	930	1,650	600	1,200
*Length, 400 feet.	30	60	136	200	410	670	1,170	430	850
*Length, 600 feet.	25	50	110	165	330	530	940	340	670
*Length, 1,000 feet.	20	40	85	130	250	410	730	260	530

*Length equals distance along piping from source of steam supply to top of each riser plus allowances for elbows, valves and plus 25 feet allowance for radiator connection.

Spring-pieces, that is, connections from steam main to risers, must always be made one size larger than the riser. Return spring-pieces make same size as return riser.

Important Points in Design and Installation

Grade steam mains with a fall of ½ inch in ten feet, and return mains 1 inch in ten feet in direction of flow. When conditions permit run steam and return mains together and grade in same direction.

Gurney

PROPERTIES OF SATURATED STEAM.

Vacuum, Inches of Mercury	Absolute Pressure Lbs. per Sq. Inch	Temperature Fahrenheit	Total Heat above 32° F.		Latent Heat, Heat Units per lb.
			In the Water Heat Units per lb.	In the Steam Heat Units per lb.	
23.81	3.0	141.52	109.4	1121.6	1012.3
21.78	4.0	153.01	120.9	1126.5	1005.7
19.74	5.0	162.28	130.1	1130.5	1000.3
17.70	6.0	170.06	137.9	1133.7	995.8
15.67	7.0	176.85	144.7	1136.5	991.8
13.63	8.0	182.86	150.8	1139.0	988.2
11.60	9.0	188.27	156.2	1141.1	985.0
9.56	10.0	193.22	161.1	1143.1	982.0
7.52	11.0	197.95	165.7	1144.9	979.2
5.49	12.0	201.96	169.9	1146.5	976.6
3.45	13.0	205.87	173.8	1148.0	974.2
1.42	14.0	209.55	177.5	1149.4	971.9
Lbs. Gauge					
0.0	14.7	212.0	180.0	1150.4	970.4
0.3	15.0	213.0	181.0	1150.7	969.7
1.3	16.0	216.3	184.4	1152.0	967.6
2.3	17.0	219.4	187.5	1153.1	965.6
3.3	18.0	222.4	190.5	1154.2	963.7
4.3	19.0	225.2	193.4	1155.2	961.8
5.3	20.0	228.0	196.1	1156.2	960.0
10.3	25.0	240.1	208.4	1160.4	952.0
15.3	30.0	250.3	218.8	1163.9	945.1
20.3	35.0	259.3	227.9	1166.8	938.9
25.3	40.0	267.3	236.1	1169.4	933.3
30.3	45.0	274.5	243.4	1171.6	928.2
40.3	55.0	287.1	256.3	1175.4	919.0
50.3	65.0	298.0	267.5	1178.5	911.0
60.3	75.0	307.6	277.4	1181.1	903.7
70.3	85.0	316.3	286.3	1183.4	897.1
80.3	95.0	324.1	294.5	1185.4	890.9
91.3	106.0	332.0	302.7	1187.4	884.7
101.3	116.0	338.7	309.6	1189.0	879.3
125.3	140.0	353.1	324.6	1192.2	867.7
151.3	166.0	366.5	338.7	1195.1	856.4
175.3	190.0	377.6	350.4	1197.3	846.9
200.3	215.0	388.0	361.4	1199.2	837.9
225.3	240.0	397.4	371.4	1200.9	829.5
255.3	270.0	407.9	382.5	1202.6	820.1

Gurney

SIZE OF EXPANSION TANKS.

For Hot Water Heating Systems.

Expansion tanks for hot water heating systems should be proportioned according to the amount of radiation that is carried. They should be of ample size, so that they will not overflow frequently, and the user should be cautioned against filling the tank too full. If before starting the fire in the boiler the water shows 3 or 4 inches in a gauge glass that is connected near the bottom of tank that is sufficient, as the water will gradually rise in the glass as the water in the system becomes heated.

The following table gives the size and contents of expansion tanks that are adaptable to the amounts of radiation specified:

Size	Gallons (U.S.)	Sq. Ft. Radiation
12″ x 24″	12	up to 500
14″ x 30″	20	
or		
16″ x 24″	21	" 750
16″ x 30″	26	" 1000
16″ x 36″	32	
or		
18″ x 30″	33	" 1500
16″ x 48″	42	
or		
18″ x 40″	44	" 2000
18″ x 48″	53	" 2500
18″ x 60″	66	" 3000

For systems carrying larger amounts of radiation than that given above allow 18 to 20 gallon capacity in the tank per thousand feet of radiation.

Frequently cases will occur where the ceiling height will not permit using the above sized tanks vertically, particularly with the larger sized tanks. When required special tanks can be placed in a horizontal position, and in such cases the arrangement of the connections for the expansion and vent pipes and the gauge glass will be made to suit these conditions.

NUMBER OF GALLONS IN ROUND TANKS.

Length (or Height), Diameter and Capacity in U. S. Gallons.

Depth or Length	18-inch	24-inch	30-inch	36-inch	42-inch	48-inch	54-inch	60-inch	66-inch	72-inch
1 Inch	1.10	1.96	3.06	4.41	5.99	7.83	9.91	12.24	14.81	17.62
1 ft.	13.	23.	37.	53.	72.	94.	119.	147.	178.	211.
1½ ft.	20.	35.	55.	79.	108.	141.	179.	220.	267.	317.
2 ft.	26.	47.	73.	106.	144.	188.	238.	294.	355.	423.
2½ ft.	33.	59.	92.	132.	180.	235.	298.	367.	444.	529.
3 ft.	40.	71.	110.	159.	216.	282.	357.	441.	533.	634.
3½ ft.	46.	82.	129.	185.	252.	329.	417.	514.	622.	740.
4 ft.	53.	94.	147.	211.	288.	376.	476.	587.	711.	846.
4½ ft.	59.	106.	165.	238.	324.	423.	536.	661.	800.	952.
5 ft.	66.	118.	183.	264.	360.	470.	597.	734.	889.	1157.
5½ ft.	73.	129.	202.	291.	396.	517.	657.	808.	977.	1263.
6 ft.	79.	141.	220.	317.	432.	564.	714.	881.	1066.	1369.
7 ft.	92.	164.	257.	370.	504.	658.	833.	1028.	1244.	1580.
8 ft.	106.	188.	294.	423.	576.	752.	952.	1175.	1422.	1792.
9 ft.	119.	212.	330.	476.	648.	846.	1071.	1322.	1599.	2003.
10 ft.	132.	235.	367.	529.	720.	940.	1190.	1469.	1777.	2115.
12 ft.	157.	282.	440.	634.	864.	1128.	1428.	1762.	2133.	2537.
14 ft.	185.	329.	514.	740.	1008.	1316.	1666.	2056.	2488.	2960.
16 ft.	211.	376.	587.	846.	1152.	1504.	1904.	2350.	2844.	3383.
18 ft.	238.	423.	661.	952.	1296.	1692.	2142.	2644.	3199.	3806.
20 ft.	264.	470.	734.	1057.	1440.	1880.	2380.	2937.	3554.	4229.

One-inch Depth is given to facilitate figuring intermediate depths.

For tanks having a diameter other than those given in the table, multiply the square of the diameter in inches by the length in feet and multiply this product by 0.0408 to obtain tank capacity in U. S. gallons. When both diameter and length are given in inches, the capacity in U. S. gallons equals $0.0034 \times D^2 \times L$.

Gurney

REQUIREMENTS FOR CHIMNEYS.

No Chimney flues should be less than 8 in. x 8 in., or 8 in. diameter if round.

Chimneys should be:

1—Straight and free from any obstructions.

2—A separate flue should be provided for each fire.

3—There should be no opening into the flue except that at the bottom to receive the smoke pipe from the boiler or furnace and the cleanout opening door for the removal of soot.

4—The same size and shape should be maintained throughout.

5—They should be built up clear of any obstructing buildings.

6—They should be built on inside walls and not outside walls, wherever possible.

The fact that a flue will draw up a lighted piece of paper or other light material is no indication of a good or fair draft. An indicated velocity is not proof of a good draft. It is necessary that it shall be of sufficient area to carry away the gases of combustion. The draft of a chimney depends both on the area of flue and the velocity due to height. Square or round chimneys are always to be preferred. Wide chimneys that are shallow in depth **ARE TO BE AVOIDED.**

The following table of chimney sizes will be found to give results under average conditions with all up-draft boilers.

RADIATION (Direct)		CHIMNEY SIZE	
Hot Water, Feet	Steam, Feet	Round, Inches	Rectangular, Inches
400 to 700	250 to 450	8	8 x 8
800 to 1,200	500 to 800	10	8 x 13
1,300 to 2,200	850 to 1,400	12	13 x 13
2,400 to 3,500	1,500 to 2,100	14	13 x 17
3,600 to 5,500	2,200 to 3,500	16	17 x 17
5,600 to 10,000	3,600 to 6,000	18	17 x 21

REQUIREMENTS FOR CHIMNEYS—

Continued.

A more specific table is given by Prof. R. C. Carpenter suitable to various sized heating plants and different chimney heights, as follows:

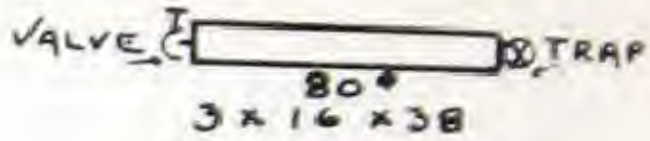
RADIATION (Direct)		Height of Chimney Flue				
Steam, Feet	Hot Water, Feet	30 ft.	40 ft.	50 ft.	80 ft.	60 ft.
		Inches	Inches	Inches	Inches	Inches
250	**375**	7.0	6.7	6.4	6.2	6.0
500	**750**	9.2	8.8	8.2	8.0	6.6
750	**1,150**	10.8	10.2	9.6	9.3	8.8
1,000	**1,500**	12.0	11.4	10.8	10.5	10.0
1,500	**2,250**	14.4	13.4	12.8	12.4	11.5
2,000	**3,000**	16.3	15.2	14.5	14.0	13.2
3,000	**4,500**	18.5	18.2	17.2	16.6	15.8
4,000	**6,000**	22.2	20.8	19.6	19.0	17.8
5,000	**7,500**	24.6	23.0	21.6	21.0	19.4
6,000	**9,000**	26.8	25.0	23.4	22.8	21.2
7,000	**10,500**	28.8	27.0	25.5	24.4	23.0
8,000	**12,000**	30.6	28.6	26.8	26.0	24.2
9,000	**13,500**	32.4	30.4	28.4	27.4	25.6
10,000	**15,000**	34.0	32.0	30.0	28.6	27.0

Dimensions given are diameters of flues in inches or the side of square flue.

HOW TO READ BLUE PRINTS

STANDARD SYMBOLS

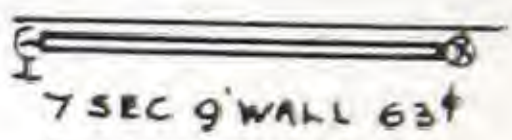
NEW RADIATOR



OLD RADIATOR

RAD WITH DIAPHRAGM VALVE

WALL RAD. ON WALL

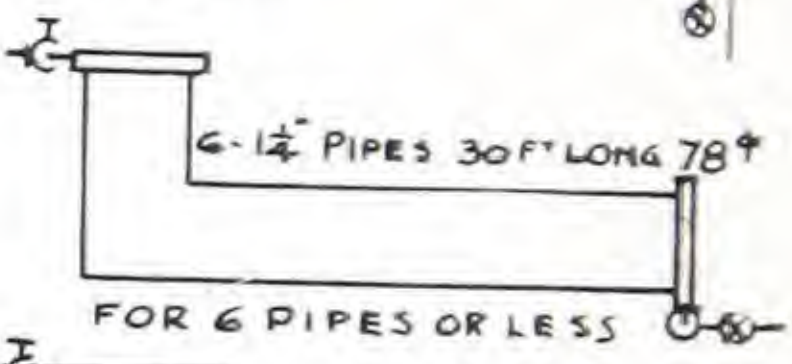


WALL RAD ON CEILING

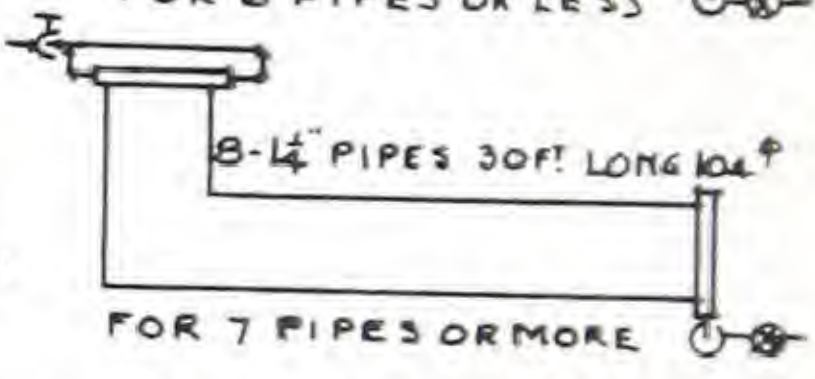
HARP PIPE COIL ON WALL

CORNER PIPE ON WALL

HARP PIPE COIL ON CEILING



HARP PIPE COIL ON CEILING



LOW PRESSURE STEAM ——————

HIGH PRESSURE STEAM ——— - ——— - ———

EXHAUST STEAM ——— - - ——— - - ———

OLD STEAM PIPE L.P ——— - - - ——— - - - ———

DRY RETURN PIPE — — — — — — — — — —

OLD RETURN PIPE ----------

DRY DRIP LINE — — — — — —

WET DRIP OR WET RETURN ——— ———

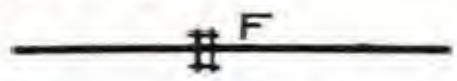
OLD DRIP PIPE —//— —//— —//— —//—

PLUGGED TEE

ECCENTRIC REDUCER

HOW TO READ BLUE PRINTS, Continued

STANDARD SYMBOLS

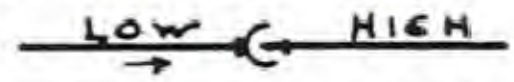
FLANGES (BOLTED) 

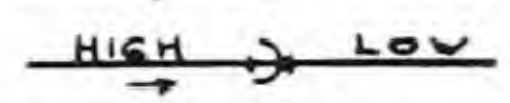
UNIONS (SCREWED) 

EXPANSION JOINT 

ANCHOR 

CONNECTIONS TO MAINS
- FROM TOP 
- FROM SIDE 
- FROM BOTTOM 

RISE IN MAIN 

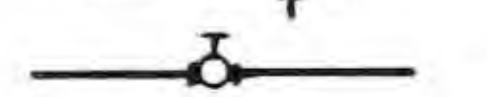
DROP IN MAIN 

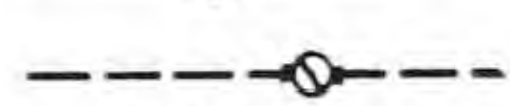
RISER & NUMBER OF RISER (12) ○○

GR FLOOR RAD. CONNECTION ●●

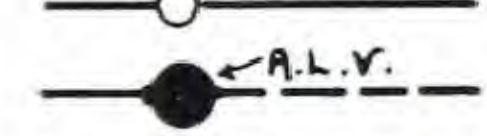
GATE VALVE 

ANGLE VALVE 

GLOBE VALVE 

SWING CHECK VALVE 

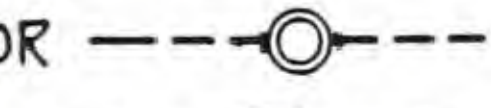
DIAPHRAGM VALVE 

AIR LINE VALVE 

LOW PRESSURE TRAP 

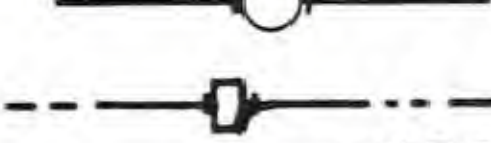
HIGH PRESSURE TRAP 

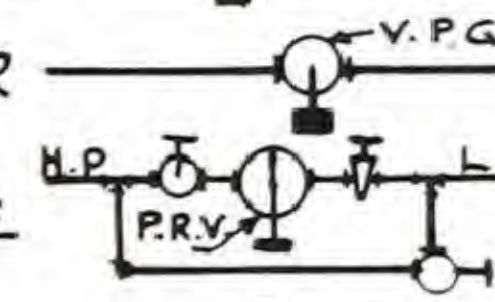
AIR VENT OR AIR ELIMINATOR 

SUCTION STRAINER 

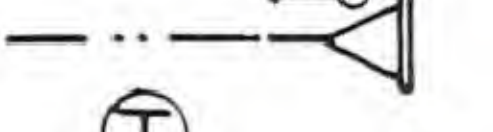
STEAM SEPARATOR 

OIL SEPARATOR 

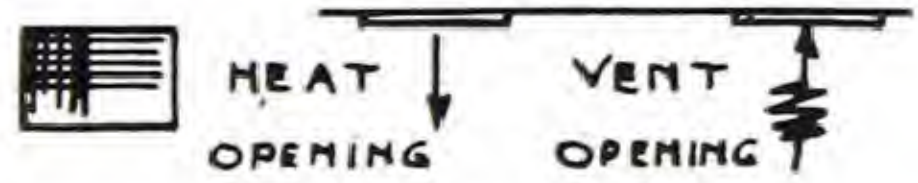
VACUUM PUMP GOVERNOR 

PRESSURE REDUCING VALVE 

BACK PRESSURE VALVE 

EXHAUST HEAD 

THERMOSTAT (T)

FLOOR REGISTER 

Gurney

TO ASCERTAIN HORSEPOWER OF BOILERS

Standard adopted by American Society of Mechanical Engineers is 30 pounds of water evaporated into dry steam per hour from temperature of feed water 100 degrees Fahrenheit into steam of 70 pounds pressure.

Compound engines will develop a horsepower on 15 pounds of water.

Single condensing engine will develop a horsepower on 18 to 22 pounds of water.

Automatic non-condensing engines will develop a horsepower on 28 to 32 pounds of water.

Slide-valve throttle-governing engine will develop a horsepower on 1 cubic foot, or 62½ pounds of water.

Steam Memoranda.

A cubic inch of water evaporated under ordinary atmosphere pressure is converted into 1 cubic foot of steam (approximately).

The specific gravity of steam (at atmospheric pressure) is .411 that of air at 34 degrees Fahrenheit, and .0006 that of water at same temperature.

27.222 cubic feet of steam weigh 1 pound; 13.817 cubic feet of air weigh 1 pound.

Locomotives average a consumption of 3,000 gallons of water per 100 miles run.

The best designed boilers, well set, with good draft, and skillful firing, will evaporate from 7 to 10 pounds of water per pound of first-class coal.

On 1 square foot of grate can be burned on an average from 10 to 12 pounds of hard coal, or 18 to 20 pounds of soft coal per hour, with natural draft. With forced draft nearly double these amounts can be burned.

Steam engines, in economy, vary from 14 to 60 pounds of feed water, and from 1½ to 7 pounds of coal per hour per indicated horsepower.

Condensing engines require from 20 to 30 gallons of water, at an average low temperature, to condense the steam represented by every gallon of water evaporated in the boilers supplying the engines—approximately for most engines, we say, from 1 to 1½ gallons condensing water per minute, per indicated horsepower.

Horsepower of an Engine.

a=Area of the piston in square inches.
p=Mean velocity pressure of steam on piston per square inch.
v=Velocity of piston per minute.

$$\text{Then H. P.} = \frac{a \times p \times v}{33.000}$$

The mean pressure in the cylinder when cutting off at

¼	stroke	=	boiler	pressure	multiplied	by .597
⅓	"	=	"	"	"	" .670
⅜	"	=	"	"	"	" .743
½	"	=	"	"	"	" .847
⅝	"	=	"	"	"	" .919
⅔	"	=	"	"	"	" .937
¾	"	=	"	"	"	" .966
⅞	"	=	"	"	"	" .992

To find the diameter of a cylinder of an engine of a required nominal horsepower:

$$\frac{5500}{v} \text{ multiplied by H. P.} = a$$

To find the weight of the rim of the fly-wheel for an engine:

$$\frac{\text{Nominal H. P. multiplied by 2,000}}{\text{Sq. of velocity of circumference in ft. per second}} = \text{wt. in cwts.}$$

RULES RELATIVE TO THE CIRCLE

To Find Side of an Inscribed Square.

Multiply diameter by 0.7071, or multiply circumference by 0.2251, or divide circumference by 4.4428.

To Find Side of an Equal Square.

Multiply diameter by 0.8862, or divide diameter by 1.1284, or multiply circumference by 0.2821, or divide circumference by 3.545.

Square.

A side multiplied by 1.1442 equals diameter of its circumscribing circle.

A side multiplied by 4.443 equals circumference of its circumscribing circle.

A side multiplied by 1.128 equals diameter of an equal circle.

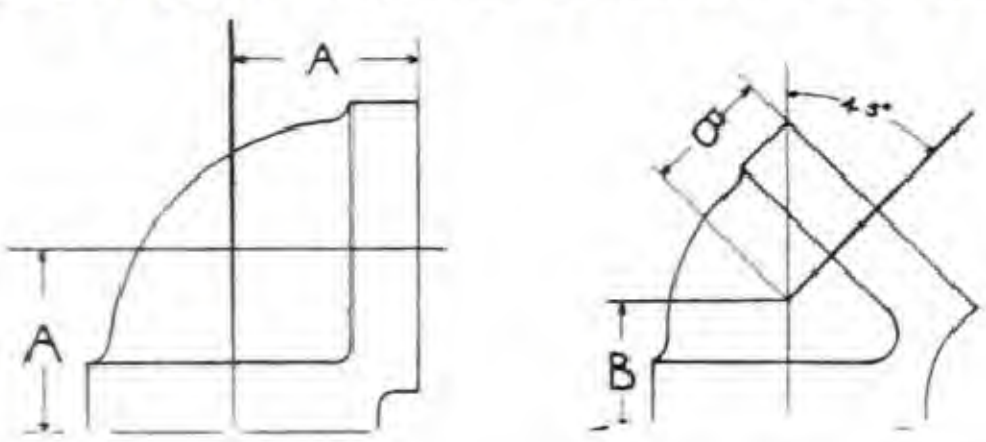
A side multiplied by 3.547 equals circumference of an equal circle.

Square inches multiplied by 1.273 equals circle inches of an equal circle.

To Find the Surface of a Sphere or Globe.

Multiply the diameter by the circumference, or multiply the square of diameter by 3.1416, or multiply 4 times the square of radius by 3.1416.

DIMENSIONS OF STANDARD CAST IRON FITTINGS



Size inches	A	B	Size inches	A	B
1	1 1/2	1 1/16	4 1/2	4 1/4	2 9/16
1 1/4	1 11/16	1 3/16	5	4 3/8	2 3/4
1 1/2	1 7/8	1 5/16	6	5 1/16	3 1/8
2	2 1/8	1 1/2	7	5 11/16	3 3/8
2 1/2	2 9/16	1 3/4	8	6 7/16	3 5/8
3	3 1/16	1 15/16	9	7 1/4	4 1/4
3 1/2	3 7/16	2 1/8	10	8 3/16	4 3/4
4	3 3/4	2 3/8	12	9 3/4	5 1/4

Gurney

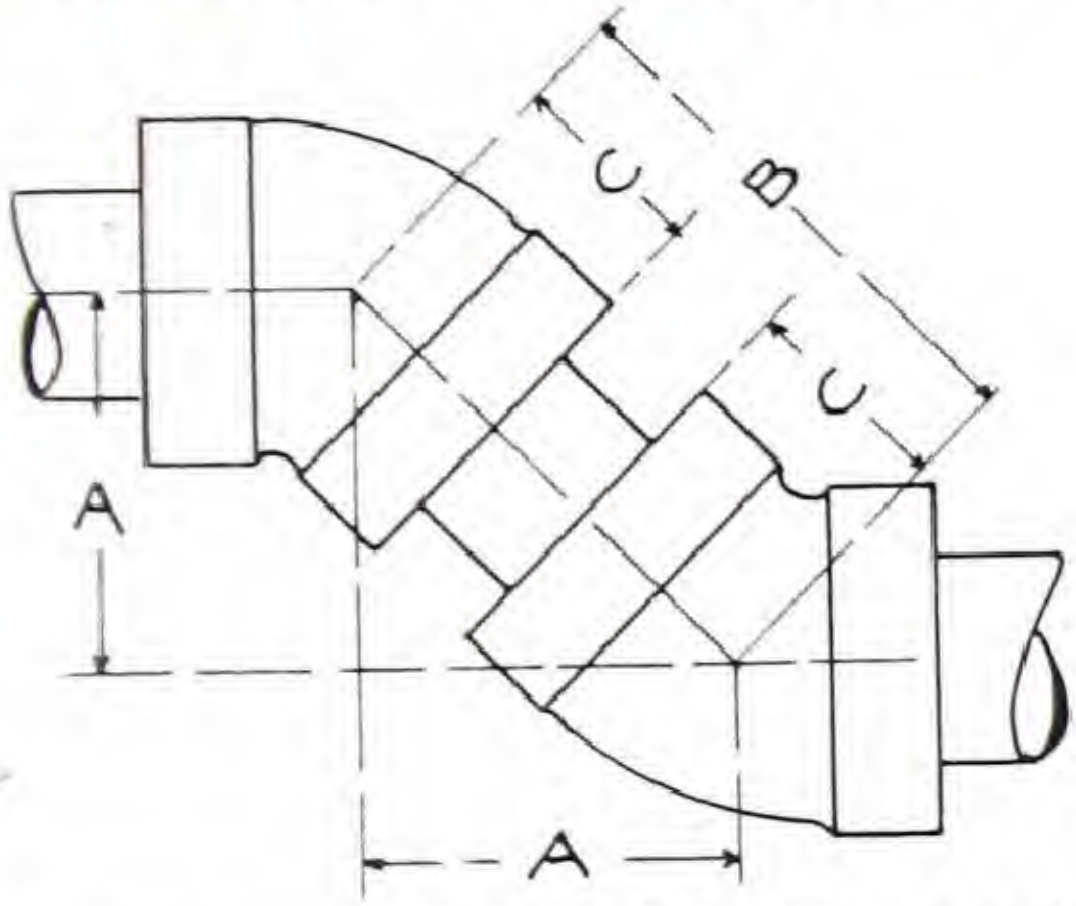
AREA OF CIRCLES.

Diam. Inches	Area	Diam. Inches	Area	Diam. Inches	Area	Diam. Inches	Area
$\frac{1}{8}$	.012	7	38.48	19	283.53	37	1,075.2
$\frac{1}{4}$	.049	$7\frac{1}{2}$	44.17	$19\frac{1}{2}$	298.64	38	1,134.1
$\frac{3}{8}$	.110	8	50.26	20	314.16	39	1,194.6
$\frac{1}{2}$	.196	$8\frac{1}{2}$	56.74	$20\frac{1}{2}$	330.06	40	1,256.6
$\frac{3}{4}$	.441	9	63.61	21	346.36	41	1,320.2
1	.785	$9\frac{1}{2}$	70.88	$21\frac{1}{2}$	363.05	42	1,385.4
$1\frac{1}{8}$	.994	10	78.54	22	380.13	43	1,452.2
$1\frac{1}{4}$	1.227	$10\frac{1}{2}$	86.59	$22\frac{1}{2}$	397.60	44	1,520.5
$1\frac{1}{2}$	1.767	11	95.03	23	415.47	45	1,590.4
$1\frac{3}{4}$	2.405	$11\frac{1}{2}$	103.87	$23\frac{1}{2}$	433.73	46	1,661.9
2	3.141	12	113.10	24	452.39	47	1,734.9
$2\frac{1}{4}$	3.976	$12\frac{1}{2}$	122.71	$24\frac{1}{2}$	471.43	48	1,808.5
$2\frac{1}{2}$	4.908	13	132.72	25	490.8	49	1,885.5
$2\frac{3}{4}$	5.939	$13\frac{1}{2}$	143.13	26	530.9	50	1,963.5
3	7.06	14	153.94	27	572.5	51	2,042.8
$3\frac{1}{4}$	8.29	$14\frac{1}{2}$	165.13	28	615.7	52	2,123.7
$3\frac{1}{2}$	9.62	15	176.71	29	660.5	53	2,206.1
$3\frac{3}{4}$	11.04	$15\frac{1}{2}$	188.69	30	706.8	54	2,290.2
4	12.56	16	201.06	31	754.7	55	2,375.8
$4\frac{1}{2}$	15.90	$16\frac{1}{2}$	213.82	32	804.2	56	2,463.0
5	19.63	17	226.98	33	855.3	57	2,551.7
$5\frac{1}{2}$	23.75	$17\frac{1}{2}$	240.52	34	907.9	58	2,642.0
6	28.27	18	254.46	35	962.1	59	2,733.9
$6\frac{1}{2}$	33.18	$18\frac{1}{2}$	268.80	36	1,017.8	60	2,827.4

Other dimensions of circles are obtained, viz.:

Diameter × 3.1416=circumference.
Diameter × .8862=side of an equal square.
Diameter × diameter × .7854=area of circle.
Circumference ÷ 3.1416=diameter.
Circumference ÷ 6.28318=one-half of diameter or radius.
Circumference × ¼ of diameter=area of circle.
Square inches × .007=square feet.
Circular inches × .00546=square feet.
Cubic inches × .00058=cubic feet.

OFFSET CONNECTIONS



TABLE—45 DEGREE OFFSETS

Pipe Size	Close Nipple				Short Nipple			
	Length of Nipple	Offset A	Centre to Centre B	Centre to Face C	Length of Nipple	Offset A	Centre to Centre B	Centre to Face C
$\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{5}{16}$	$1\frac{7}{8}$	$\frac{7}{8}$	$1\frac{1}{2}$	$1\frac{9}{16}$	$2\frac{1}{4}$	$\frac{7}{8}$
$\frac{3}{8}$	$1\frac{3}{8}$	$1\frac{11}{16}$	$2\frac{3}{8}$	1	2	$2\frac{3}{16}$	3	1
$\frac{1}{2}$	$1\frac{1}{2}$	$1\frac{7}{8}$	$2\frac{5}{8}$	$1\frac{1}{8}$	2	$2\frac{1}{4}$	$3\frac{1}{8}$	$1\frac{1}{8}$
$\frac{3}{4}$	$1\frac{5}{8}$	$2\frac{1}{8}$	3	$1\frac{5}{16}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{7}{8}$	$1\frac{5}{16}$
1	$1\frac{3}{4}$	$2\frac{3}{8}$	$3\frac{3}{8}$	$1\frac{7}{16}$	$2\frac{1}{2}$	$2\frac{15}{16}$	$4\frac{1}{8}$	$1\frac{7}{16}$
$1\frac{1}{4}$	2	$2\frac{13}{16}$	4	$1\frac{11}{16}$	$2\frac{1}{2}$	$3\frac{3}{16}$	$4\frac{1}{2}$	$1\frac{11}{16}$
$1\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{3}{16}$	$4\frac{1}{2}$	$1\frac{15}{16}$	3	$3\frac{9}{16}$	5	$1\frac{15}{16}$
2	$2\frac{5}{8}$	$3\frac{9}{16}$	5	$2\frac{3}{16}$	3	$3\frac{13}{16}$	$5\frac{3}{8}$	$2\frac{3}{16}$
$2\frac{1}{2}$	$2\frac{3}{4}$	$3\frac{13}{16}$	$5\frac{3}{8}$	$2\frac{3}{8}$	4	$4\frac{11}{16}$	$6\frac{5}{8}$	$2\frac{3}{8}$
3	3	$4\frac{5}{16}$	$6\frac{1}{8}$	$2\frac{5}{8}$	4	$5\frac{1}{16}$	$7\frac{1}{8}$	$2\frac{5}{8}$
$3\frac{1}{2}$	3	$4\frac{1}{2}$	$6\frac{3}{8}$	$2\frac{13}{16}$	4	$5\frac{3}{16}$	$7\frac{3}{8}$	$2\frac{13}{16}$
4	$3\frac{1}{4}$	$4\frac{15}{16}$	7	$3\frac{1}{16}$	$4\frac{1}{2}$	$5\frac{13}{16}$	$8\frac{1}{4}$	$3\frac{1}{16}$
$4\frac{1}{2}$	$3\frac{1}{4}$	$5\frac{3}{8}$	$7\frac{5}{8}$	$3\frac{7}{16}$	$4\frac{1}{2}$	$6\frac{1}{4}$	$8\frac{7}{8}$	$3\frac{7}{16}$
5	$3\frac{1}{2}$	$6\frac{3}{16}$	$8\frac{3}{4}$	$3\frac{7}{8}$	5	$7\frac{1}{4}$	$10\frac{1}{4}$	$3\frac{7}{8}$
6	$3\frac{1}{2}$	$6\frac{5}{8}$	$9\frac{3}{8}$	$4\frac{1}{4}$	5	$7\frac{11}{16}$	$10\frac{7}{8}$	$4\frac{1}{4}$
7								
8								

The Offset "A" is Equal to the Distance "B" Divided by 1.414

WEIGHTS AND MEASURES

Linear Measure.

12 inches .....equal 1 foot, ft.
3 feet ..... " 1 yard, yd.
5.5 yards ..... " 1 rod, rd.
40 rods ..... " 1 furlong, fur.
8 furlongs ..... " 1 mile, mi.

Inch	Feet	Yard	Rod	Fur.	Mile
36 equal.....	3	1			
198 "	16.5	5.5	1		
7920 "	660	220	40	1	
63,360 "	5280	1760	320	8	1

Square Measure.

144 square in. ....equal 1 square foot, sq. ft.
9 square ft. ..... " 1 square yard, sq. yd.
30¼ square yd. .... " 1 square rod, sq. rd.
160 square rod. ... " 1 acre, A.
640 acres ..... " 1 square mile, sq. mi.

Sq. mi.	A.	sq. rd.	sq. yd.	sq. ft.	sq. in.
1 equals	640	102,400	3,097,600	27,878,400	4,014,489,600

Surveyors' Measure.

7.92 inches .....equal 1 link, li.
25 links ..... " 1 rod, rd.
4 rods ..... " 1 chain, ch.
100 links ..... " 1 chain, ch.
66 feet ..... " 1 chain, ch.
80 chains ..... " 1 mile, mi.

1 mi. equals 80 ch. equals 320 rd. equals 8000 li. equals 63,360 in.

Surveyors' Square Measure.

625 square li. .....equal 1 square rod, sq. rd.
16 square rd. ..... " 1 square chain, sq. ch.
10 square ch. ..... " 1 acre, A.
640 acres ..... " 1 square mile, sq. mi.
36 square miles (6 mi. sq.)..... " township, tp.

1 sq. mi. equals 640 A. equals 6400 sq. ch. equals 102,400 sq. rd. equals 64,000,000 sq. li.

The acre contains 4840 sq. rd., or 43,560 sq. ft., and in the form of a square, 208.71 feet on a side.

Sample

WEIGHTS AND MEASURES

Daily Memory

WEIGHTS AND MEASURES

Linear Measure.

12 inches .....equal 1 foot, ft.
3 feet ..... " 1 yard, yd.
5.5 yards ..... " 1 rod, rd.
40 rods ..... " 1 furlong, fur.
8 furlongs ..... " 1 mile, mi.

Inch	Feet	Yard	Rod	Fur.	Mile
36 equal.....	3	1			
198 "	16.5	5.5	1		
7920 "	660	220	40	1	
63,360 "	5280	1760	320	8	1

Square Measure.

144 square in. ....equal 1 square foot, sq. ft.
9 square ft. ..... " 1 square yard, sq. yd.
30¼ square yd. .... " 1 square rod, sq. rd.
160 square rod. ... " 1 acre, A.
640 acres ..... " 1 square mile, sq. mi.

Sq. mi.	A.	sq. rd.	sq. yd.	sq. ft.	sq. in.
1 equals	640	102,400	3,097,600	27,878,400	4,014,489,600

Surveyors' Measure.

7.92 inches .....equal 1 link, li.
25 links ..... " 1 rod, rd.
4 rods ..... " 1 chain, ch.
100 links ..... " 1 chain, ch.
66 feet ..... " 1 chain, ch.
80 chains ..... " 1 mile, mi.

1 mi. equals 80 ch. equals 320 rd. equals 8000 li. equals 63,360 in.

Surveyors' Square Measure.

625 square li. .....equal 1 square rod, sq. rd.
16 square rd. ..... " 1 square chain, sq. ch.
10 square ch. ..... " 1 acre, A.
640 acres ..... " 1 square mile, sq. mi.
36 square miles (6 mi. sq.)..... " township, tp.

1 sq. mi. equals 640 A. equals 6400 sq. ch. equals 102,400 sq. rd. equals 64,000,000 sq. li.

The acre contains 4840 sq. rd., or 43,560 sq. ft., and in the form of a square, 208.71 feet on a side.

WEIGHTS AND MEASURES

Cubic Measure.

1728 cubic inches ..equal 1 cubic foot
27 cubic feet ..... " 1 cubic yard
128 cubic feet ..... " 1 cord
24¾ cubic feet ..... " 1 perch
1 cu. yd. equals 27 cu. ft. equals 46,656 cu. in.

Measure of Angles or Arcs.

60 seconds (″) ....equal 1 minute, ′.
60 minutes ..... " 1 degree, °.
90 degrees ..... " 1 rt. angle or quadrant
360 degrees ..... " 1 circle, cir.
1 cir. equals 360° equals 21,600′ equals 1,296,000″.

Avoirdupois Weight.

437.5 grains .....equal 1 ounce, oz.
16 ounces ..... " 1 pound, lb.
100 pounds ..... " 1 hundredweight, cwt.
20 hundredweight " 1 ton, T.
1 T. equals 20 cwt. equals 2000 lb. equals 32,000 oz. equals 14,000,000 gr.
The avoirdupois pound contains 7000 grains.

Long Ton Weight.

16 ounces .....equal 1 pound, lb.
112 pounds ..... " 1 hundredweight, cwt.
20 cwt. or 2240 lbs " 1 ton, T.

Troy Weight.

24 grains .....equal 1 pennyweight, pwt.
20 pennyweight .... " 1 ounce, oz.
12 ounces ..... " 1 pound, lb.
1 lb. equals 12 oz. equals 240 pwt. equals 5760 gr.

Apothecaries' Weight.

20 grains .....equal 1 scruple, sc.
3 scruples ..... " 1 dram, dr.
8 drams ..... " 1 ounce, oz.
12 ounces ..... " 1 pound, lb.
1 lb. equals 12 oz. equals 96 dr. equals 288 sc. equals 5760 gr.

WEIGHTS AND MEASURES

Liquid Measure.

4 gills	equal	1 pint
2 pints	"	1 quart
4 quarts	"	1 gallon
31½ gallons	"	1 barrel
2 barrels or 63 gal.	"	1 hogshead

1 hhd. equals 2 bbl. equals 63 gal. equals 252 qt. equals 504 pt. equals 2016 gi.

The U. S. gallon contains 231 cu. in. equals .134 cu. ft. nearly.

An Imperial gallon contains 277.274 cu. in.

With water at its maximum density (weighing 62.425 lb. per cu. ft.) a gallon of pure water weighs 8.345 lbs.

Dry Measure.

2 pints	equal	1 quart
8 quarts	"	1 peck
4 pecks	"	1 bushel

1 bu. equals 4 pk. equals 32 qt. equals 64 pt.

The U. S. struck bushel contains 2,150.42 cu. in. equal 1.2444 cu. ft. Its dimensions are, by law, 18½ in. in diameter and 8 in. deep. The dry gallon contains 268.8 cu. in., being ⅛ bu.

Approximately the bushel may be taken at 1¼ cu. ft.

Miscellaneous Table.

12 articles—1 dozen	20 quires—1 ream
12 dozen—1 gross	1 league—3 miles
12 gross—1 great gross	1 fathom—6 feet
2 articles—1 pair	1 hand—4 inches
20 articles—1 score	1 palm—3 inches
24 sheets—1 quire	1 span—9 inches

1 knot (U. S.) equals 6,086.07 ft. equals 1⅙ miles nearly.

1 meter equals 3 feet 3⅜ inches nearly.

METRIC AND ENGLISH MEASURES

Measures of Length.

Metric		English	
1	metre ..... =	39.37	inches
		3.28	feet
.3048	metre ..... =	1	foot
1	centimetre ..... =	.3937	inch
2.54	centimetres ..... =	1	inch
1	millimetre ..... =	.03937	in. (1-25 in., nearly)
25.4	millimetres ..... =	1	inch
1	kilometre ..... =	093.61	yards

Measures of Surface.

1	square metre .... =	10.764	square feet
.0929	square metre .... =	1	square foot
1	square centimetre =	.155	square inch
6.452	square centimetres =	1	square inch
1	square millimetre =	.00155	square inch
645.2	square millimetres =	1	square inch

Measures of Volume.

1	cubic metre .... =	35.314	cubic feet
.02832	cubic metre .... =	1	cubic foot
1	cubic decimetre .. =	61.023	cubic inches
		.0353	cubic foot
28.32	cubic decimetres =	1	cubic foot
16.387	cubic centimetres =	1	cubic inch
1	cubic centimetre =	1	millimetre
		.061	cubic inch

Measures of Capacity.

1	litre=1 cu. decimetre ..... =	61.023	cubic inches
		.0353	cubic foot
		.2202	gallon (Imp.)
		2.202	lbs. of water at 62 degrees Fahr.
28.317	litres ..... =	1	cubic foot (6.25 Imp. gallons)
4.543	litres ..... =	1	gallon (Imp.)
3.785	litres ..... =	1	gallon (U. S.)

Measures of Weight.

28.35	grammes ..... =	1	oz. avoirdupois
1	kilogramme ..... =	2.2046	pounds
.4536	kilogramme ..... =	1	pound
1	metric ton =	.9842	ton of 2240 lbs., or
1000	kilogrammes	19.68	cwts. of 2204.6 lbs.
1.016	metric ton ... =		
1016	kilogrammes	1	ton of 2240 lbs.

Gurney

METRIC AND ENGLISH MEASURES

Miscellaneous.

1	gramme per sq. millimetre ....=	1.422	lbs. per sq. inch
1	kilogramme per sq. millimetre..=	1422.32	lbs. per sq. inch
1	kilogramme per sq. centimetre.=	14.223	lbs. per sq. inch
1.0335	kg. per sq. centimetre 1 atmosphere .....=	14.7	lbs. per sq. inch
0.070308	kilogramme per sq. centimetre.=	1	lb. per sq. inch

Measures of Pressure and Weight.

1 lb. per square inch..=	144	lbs. per square foot
	2.0355	inches of mercury at 32 degrees Fahr.
	2.0416	inches of mercury at 62 degrees Fahr.
	2.309	ft. of water at 62 degrees Fahr.
	27.71	inches of water at 62 degrees Fahr.
1 Atmospheric (14.7 lbs. per sq. in.).....=	2116.3	lbs. per square foot
	33.947	ft. of water at 62 degrees Fahr.
	30	inches of mercury at 62 degrees Fahr.
	29.922	inches of mercury at 32 degrees Fahr.
	760	millimetres of mercury at 32 degrees Fahr.
1 Foot of Water at 62 degrees F.....=	.433	lbs. per square inch
	62.355	lbs. per square foot
1 inch of Mercury at 62 degrees F.....=	.491	lb. or 7.86 oz. per sq. in.
	1.132	ft. of water at 62 degrees Fahr.
	13.58	inches of water at 62 degrees Fahr.

Weight of One Cubic Foot of Pure Water.

At 32 degrees Fahr. (freezing point)	62.418 lbs.
At 39 degrees Fahr. (maximum density)	62.425 lbs.
At 62 degrees Fahr. (standard temperature)	62.355 lbs.
At 212 degrees Fahr. (boiling point, under 1 atmosphere)	59.76 lbs.
Imperial gallon=277,274 cubic inches of water at 62 degrees Fahr.	10 lbs.
American gallon=231 cubic inches of water at 62 degrees Fahr.	8.3356 lbs.

Gurney

METRIC AND ENGLISH MEASURES

General Data

1 Calorie	=	3.968	B. t. u.
1 B. t. u.	=	0.252	Calorie.
1 lb. per sq. in.	=	703.08	kilogrammes per m^2
1 Kilogramme per m^2	=	.00142	lbs. per sq. in.
1 Calorie per m^2	=	.3687	B. t. u. per sq. ft.
1 B. t. u. per sq. ft.	=	2.712	calories per m^2
1 Calorie per m^2 per degree difference Cent.	=	.2048	B. t. u. per sq. ft. per degree difference Fahr.
1 B. t. u. per sq. ft. per degree difference Fahr.	=	4.882	Calories per m^2 per degree difference Cent.
1 B. t. u. per lb	=	.556	Calories per kilog.
1 Calorie per kilog	=	1.8	B. t. u. per lb.
1 Litre of Coke at 26.3 lbs. per cubic foot	=	.93	lbs.
1 lb. of Coke at 26.3 lbs. per cubic foot	=	1.076	litres.
Water expands in bulk from 40 degrees to			

RELATIVE VALUE OF COAL AND OIL

Used for Fuel

KIND OF COAL	COAL: Lbs. water evaporated at 212° per lb. of combustion.	OIL: Barrels required to evaporate same amount of water as 1 ton of coal Petroleum 18° to 40° Baume
Pittsburg lump and nut, Pennsylvania	10.0	4.0
Pittsburg nut and slack	8.0	3.2
Anthracite, Pennsylvania	9.8	3.9
Indiana block	9.5	3.8
Georges Creek lump, Maryland	10.0	4.0
New River, West Virginia	9.7	3.8
Pocahontas lump, West Virginia	10.5	4.2
Cardiff lump, Wales	10.0	4.0
Cape Breton, Nova Scotia	9.2	3.7
Nanaimo, British Columbia	7.3	2.9
Co-operative, " "	8.9	3.6

USEFUL DATA

One cubic inch of water weighs ..... .036 lbs.
One cubic inch of cast iron weighs ..... .26 lbs.
One cubic inch of wrought iron weighs ..... .28 lbs.
One cubic inch of copper weighs ..... .32 lbs.
One cubic inch of lead weighs ..... .40 lbs.
One cubic foot of water weighs ..... 62.355 lbs.
One United States gallon of water weighs ..... 8.33 lbs.
One Imperial gallon of water weighs ..... 10.00 lbs.
One United States gallon equals ..... 231.00 cu. in.
One Imperial gallon equals ..... 277.274 cu. in.
One cubic foot of water equals ..... 7.48 U.S. gals.
One cubic foot of water equals ..... 6.23 Imp. gals.
One pound of steam equals at atmospheric pressure ..... 27.322 cu. ft.
One pound of air equals at 70 degrees Fah. ..... 13.047 cu. ft.
One Imperial gallon equals ..... .16 cu. ft.
One United States gallon equals ..... .1336 cu. ft.
One pound of water equals ..... .0272 cu. ft.
One pound of water equals ..... .12 Imp. gals.
One pound of water equals ..... .096 U.S. gals.

A column of water 1 foot high is equal to a pressure of .433 lbs. per square inch.

A pressure of 1 lb. is equal to a column of water 2.31 feet high.

Mercury freezes at 37.9 degrees Fahr. below zero, and boils at not less than 280 degrees Fahr. (below zero). Mercury boils at 662 and solidifies at 37.9 degrees Fahr.

A pint contains one twenty-third part of a cubic foot. From 32 degrees Fahr. to 212 degrees Fahr.

A pint boils at 98 degrees Fahr. in a perfect vacuum, and at the sea level at 212 degrees Fahr.

A heat unit (British Thermal Unit) is the quantity of heat required to raise one pound of water from 31 degrees to 32 degrees of Fahr., or one degree.

A pound of anthracite coal contains about 14,500 heat units.

Tons of coal in a coal bin are found by multiplying height, breadth and depth in feet together and dividing the result by 40. For soft coal divide by 35.

Water converted into steam expands about 1,700 times its volume. One cubic inch of water will produce approximately 1 cubic foot of steam.

Gurney

NOTES ON PLACING AND ERECTING BOILERS.

Read this Page Carefully.

Before the boiler is set up see that the base is level in all directions.

Before the boiler is set up make sure that there is sufficient head room for the smoke pipe, also to allow a proper grade for the mains.

If you cannot obtain this the boiler should be set in a pit, care being taken that the pit has sufficient room in front to allow the proper firing of boiler and removing of ashes.

Always place the boiler as close to the chimney as possible.

Always cover the boiler with asbestos or other non-inflammable material; this conserves the heat, and prevents cold air being drawn into smoke or fire travel through fire joints.

If you are using a coil or any kind of heater in the boiler to heat the range boiler remember it deducts 3 sq. ft. of heating capacity for every gallon of water heated, from the heating capacity of the boiler, and this should always enter into your calculations when choosing size of boiler.

Always instruct the party for whom you have installed the boiler, how to properly operate it, giving special stress to the fact that the grates will be burned out if the ashes are not removed at least once a day.

It is strongly advised that a hot water thermometer be provided for every plant, and instructions given as to the proper temperatures to maintain the water, according to the weather.

Gurney

INDEX

GENERAL—

BOILERS—

ROUND, HOT WATER—

SQUARE, HOT WATER—

ROUND, STEAM—

SQUARE, STEAM—

RADIATORS—

RADIATOR SPECIALTIES—

VALVES, FITTINGS, ETC.—Continued.

PIPE—STEAM AND WATER—

USEFUL INFORMATION

Gurney

MEMORANDA

Gurney

MEMORANDA

Gurney

MEMORANDA

GURNEY